Coal Age

JUNE, 1954

A McGRAW-HILL PUBLICATION — PRICE 50c

Automatic Heating, New Coal Booster

How new coal-burning units restore coal's strength in home markets. p 70

New Cost-Cutters

Operating Reports: Konnerth Miner in USS mines (p 76); new portable extensible belt at R&P (p 88). Full contents, p 5.

AMC Convention Report . . . p 102

High-Capacity Stripping . . . p 80

SIMPLICITY PAYS!

That's the secret of the long standing success of the A.C.F. Mine Cars.

From the operating viewpoint, they're simplicity itself—they move fast when and where you want them, unload at the rate of a ton-a-second because of the specially-designed drop bottom action.

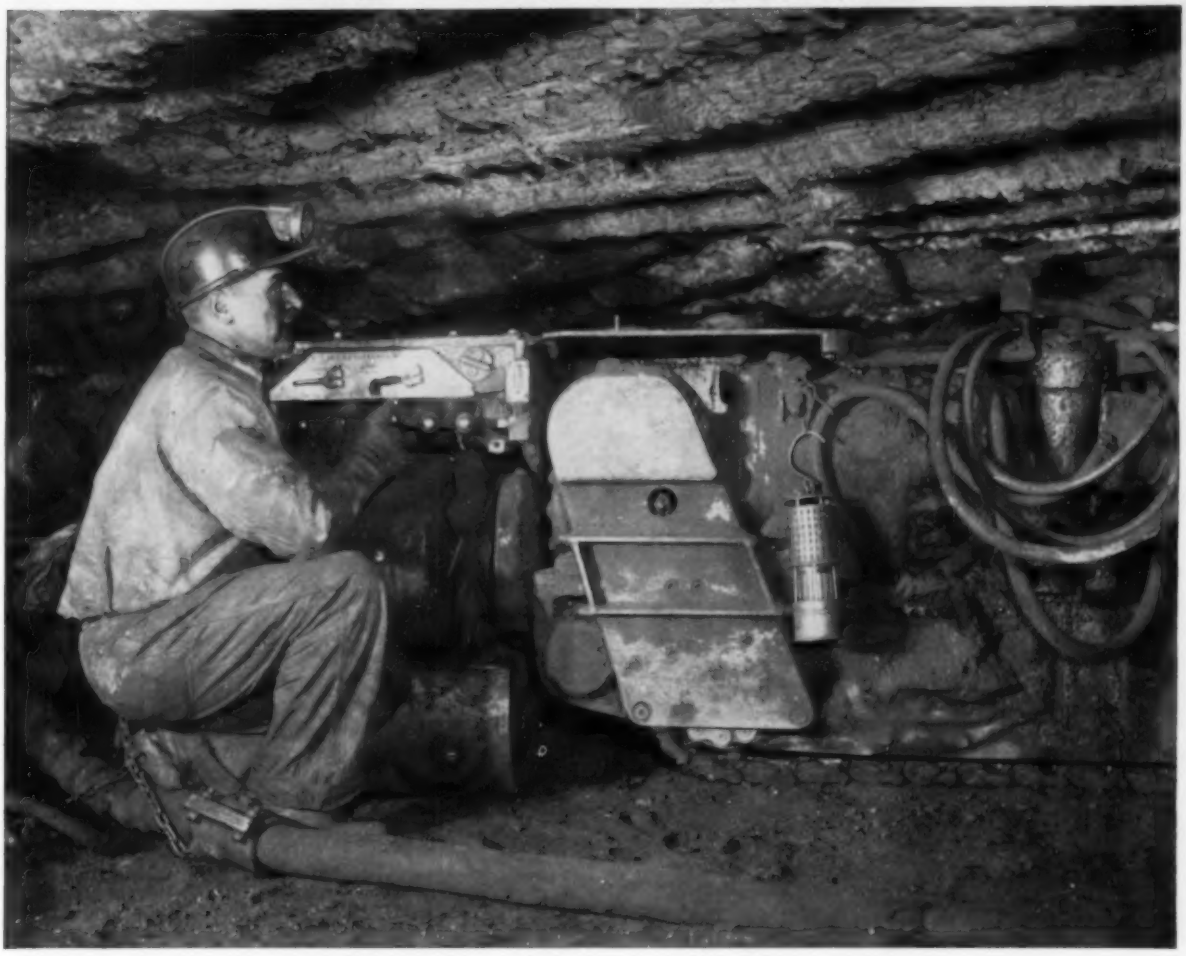
From the maintenance viewpoint, they're simplicity itself—a damaged car can be shunted to a siding and production keeps rolling. Your own men can handle most repairs right on the spot.

Why settle for less than the most economical mine transportation you can buy? See your A.C.F. Representative today. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland Philadelphia · Huntington, W. Va. · San Francisco · Washington · Berwick, Pa.

a.c.f. **MINE CARS**

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



B. F. Goodrich Grommet belts lasted eight times longer

THAT continuous mining machine used to snap steel cable V belts in five days. The sudden and frequent jerks as the machine bit into the coal couldn't be absorbed. Then the mine operator tried B. F. Goodrich high-capacity Grommet V belts. Not only did they last eight to ten times longer, but they cost ⅓ less. A yearly savings of approximately $220.00, plus more earnings because of increased machine operating time.

Only with grommet construction is it possible to increase the number of cords reinforcing a V belt and still retain flexibility and resilience. Grommets are cord loops made like giant twisted cables except that they're endless. The B. F. Goodrich high-capacity V belt carries a 40% higher horsepower rating because it's built with larger grommets, having 40% more tensile strength. Increased strength in other belts must be accomplished by using more cord or fabric layers in the base rubber, thus reducing flexibility.

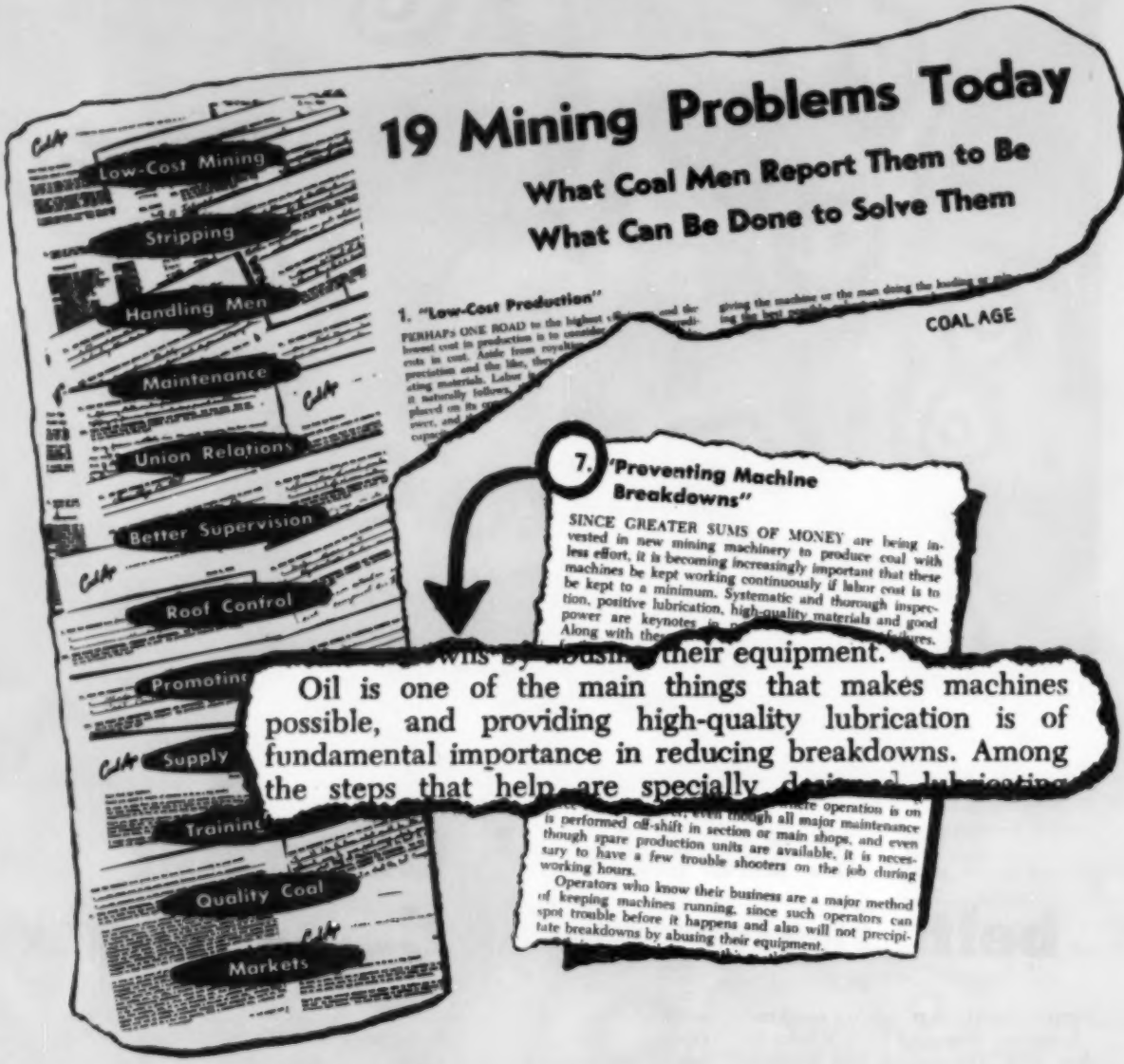
Comparison tests on identical drives show that other V belts stretch at least 65% more (sometimes even 165% more) than the B. F. Goodrich high-capacity. Actually, the Grommet is the only high-capacity belt that doesn't stretch enough to affect the efficiency of the drive. As a result, it practically eliminates the necessity of frequent and costly take-ups.

Your local B. F. Goodrich distributor has all the details and prices on other rubber products for the coal industry. Whether you need extra strong V belts, mildew resisting conveyor belts or air hose to stand rough service, your BFG distributor will show you how using B. F. Goodrich products will save you money. Call him. Or write *The B. F. Goodrich Company, Dept. M-247, Akron 18, Ohio.*

Grommet—T. M. The B. F. Goodrich Co

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

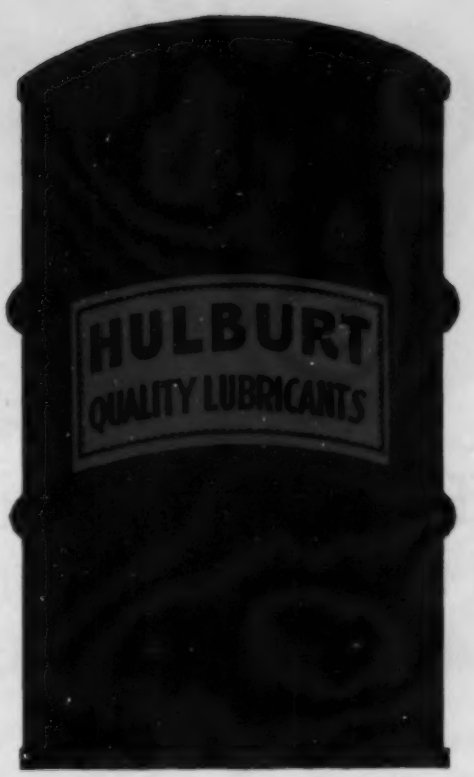
HERE'S YOUR ANSWER


19 Mining Problems Today
What Coal Men Report Them to Be
What Can Be Done to Solve Them
1. "Low-Cost Production"
COAL AGE
7. "Preventing Machine Breakdowns"
SINCE GREATER SUMS OF MONEY are being invested in new mining machinery to produce coal with less effort, it is becoming increasingly important that these machines be kept working continuously if labor cost is to be kept to a minimum. Systematic and thorough inspection, positive lubrication, high-quality materials and good power are keynotes
their equipment.
Oil is one of the main things that makes machines possible, and providing high-quality lubrication is of fundamental importance in reducing breakdowns. Among the steps that help are specially
is performed off-shift in section or main shops, and even though spare production units are available, it is necessary to have a few trouble shooters on the job during working hours.
Operators who know their business are a major method of keeping machines running, since such operators can spot trouble before it happens and also will not precipitate breakdowns by abusing their equipment.
Low-Cost Mining
Stripping
Handling Men
Maintenance
Union Relations
Better Supervision
Roof Control
Promotin
Supply
Trainin
Quality Coal
Markets

Problem **7** is **"Breakdown Prevention"**–but break down Problem **7** and you find that **Oil** is what counts **first**; and the answer to that is just one word.....**HULBURT**....

TO PROBLEM 7!

PREVENT BREAKDOWNS WITH THE RIGHT USE OF THE RIGHT LUBRICANT



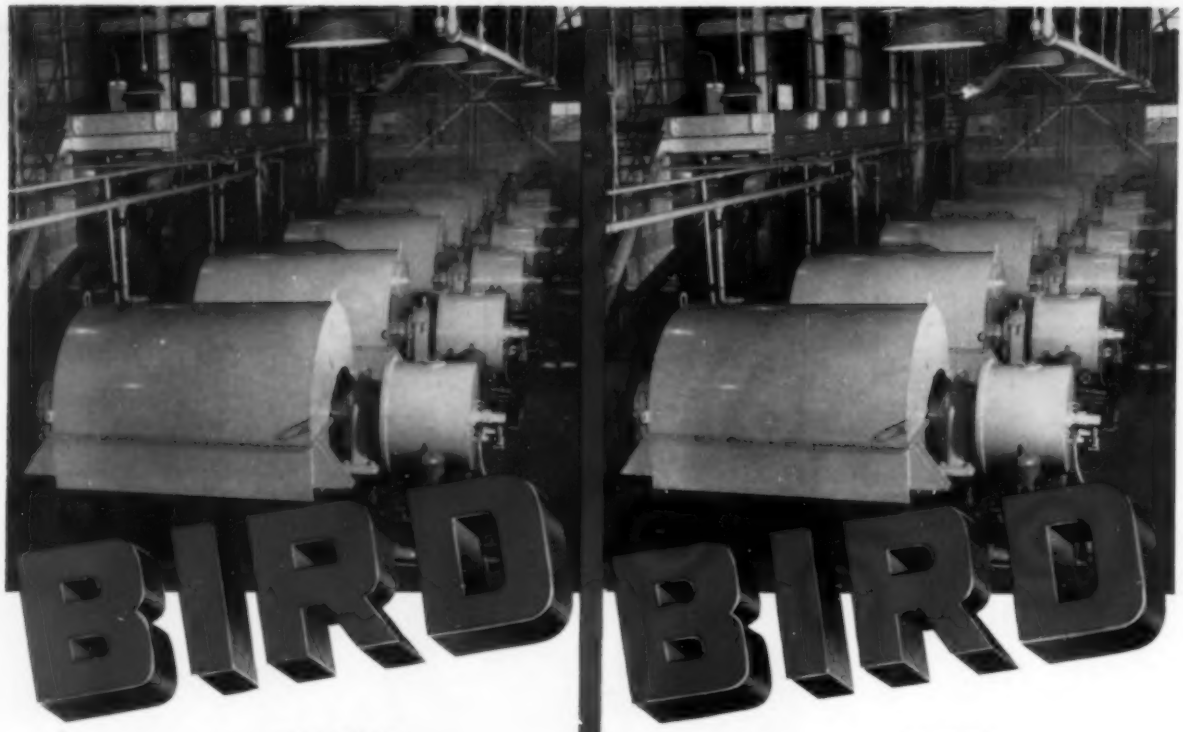
Hulburt

QUALITY LUBRICANTS

You can talk all you want, but if you don't keep your machines running, the other 18 problems won't bother you. No machines running—no mining! So choose the one lubricant compounded to do the job, the one fundamental job of fundamental importance — i.e. to keep coal mining machines from breakdown due to faulty lubrication.
Choose Hulburt Quality Lubricants.

HULBURT OIL & GREASE COMPANY — PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication



is the FILTER for FINE COAL that does the complete job

You don't have to screen the feed before dewatering. The Bird recovers all the fine coal, discharges a product low in moisture, and selectively discards high ash slimes contained in the feed.

is the FILTER for FINE COAL that runs and keeps on running,

month in and month out without shut downs. There are *no screens* in the Bird.

Operating costs are as little as five cents a ton. Maintenance averages 2 cents or less per ton.

Have you a copy of the latest Bulletin on the Bird Coal Filter?
If not, ask us to mail you one.

BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

Coal Age

JUNE • 1954

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Coming Next Month

CUTTING COST WITH MAINTENANCE—Mine-tested methods of preventing machine breakdowns, improving repair service and getting more operating time out of equipment, will be summarized in the ninth in *Coal Age's* current series of Special Reports on "Cost Cutting Today," slated to appear in the July issue. On tap, too, for next month or later are detailed "Operating Reports" on various "significant" strip and deep mines, such as:

New Stonefort Stripping—An overland belt for pit haulage, a specially designed shovel for simultaneous stripping of two seams and a 5,000-ton raw-coal stockpile are three foundations for more stripping efficiency at the new Will Scarlet mine.

Opening a Coal Mine Today—How a newly formed company went about developing a new mine in central Pennsylvania, with details of the mine design and equipment selected to achieve high tons per man at the face and a resulting strong competitive position under today's conditions.

New Central Shop built by a Kentucky company to further centralize maintenance of equipment mining 2,000,000 tons of cleaned coal annually has chalked up definite benefits, including better workmanship, reduced delays and lower costs.

Mechanized But Not Standardized is this West Virginia operation where three types of underground units are used to cope with widely varying conditions and provide a comparison of methods. A new washing plant featuring simplicity in design turns out a product very low in ash.

Developing a Mexican Bituminous Mine—Design and construction by American engineers of modern facilities to serve a new Mexican steel plant, with provision for later deeper mining and possible gas and dust hazards.

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TEXACO

TEXACO

How to make WIRE ROPE LAST LONGER

USE TEXACO CRATER—the *penetrating* lubricant that keeps rope strong longer. It goes quickly into the rope, surrounding and preserving the hemp core. Simultaneously, it coats the strands with a tough lubricating film that gives lasting protection. *Texaco Crater* guards rope against both wear and rust, brings down maintenance costs.

On open gears, *Texaco Crater* will also reduce maintenance costs. Its clinging, long-lasting film absorbs shocks, muffles noise and minimizes wear.

For both applications you may prefer the added convenience of fluid lubrication. Use *Texaco Crater X Fluid.* It *goes* on as a liquid, *stays* on as a persistent, protective film just like the regular *Texaco Crater.*

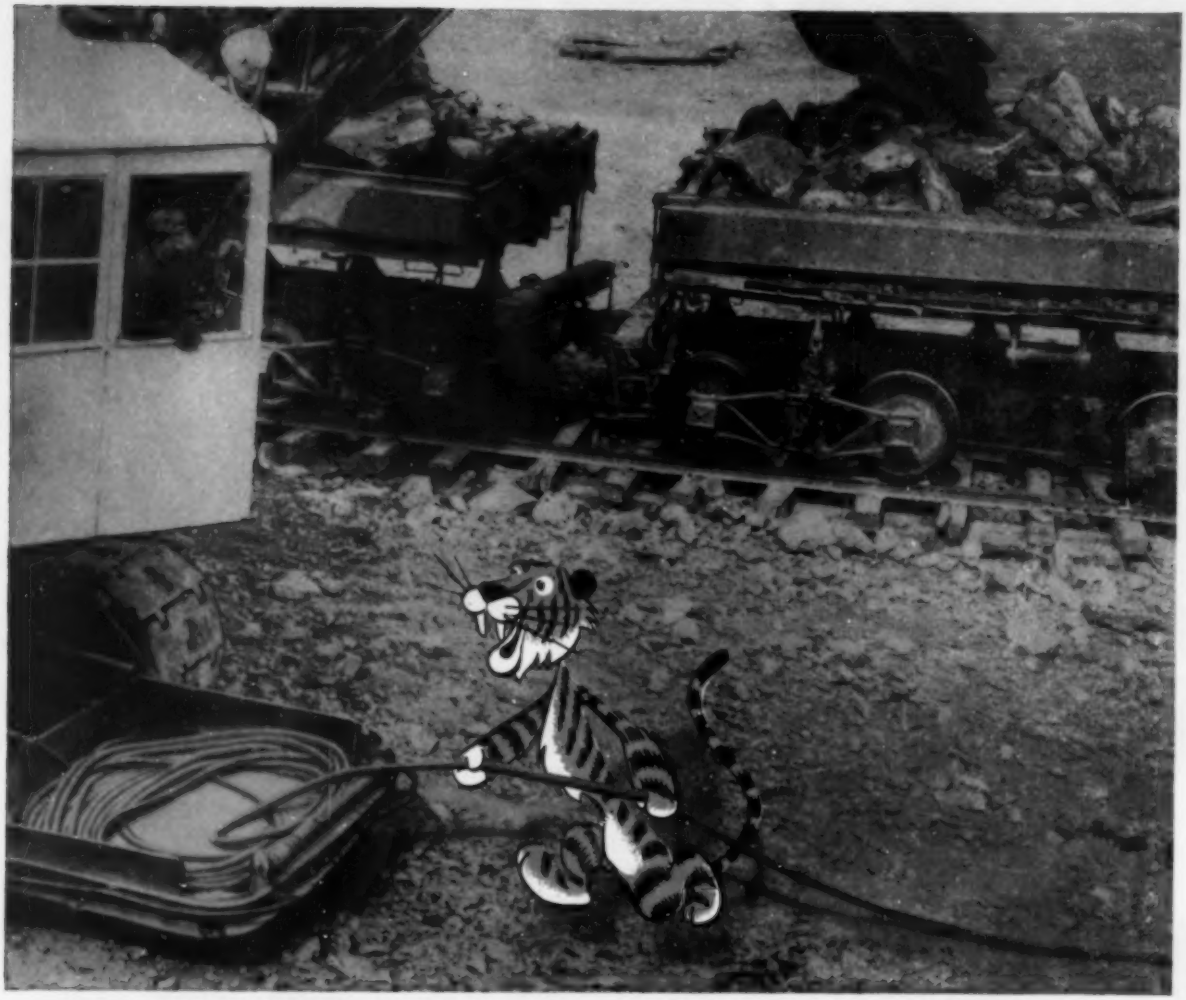
In mine car wheels, use *Texaco Olympian Grease.* You'll assure easier starts and get longer lasting protection for all types of wheel bearings.

Let a Texaco Lubrication Engineer help you use effective lubrication to get greater efficiency and reduce your costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

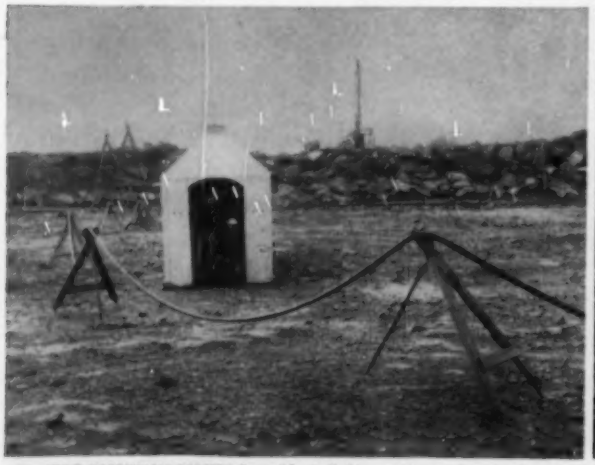
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICANTS for the Coal Mining Industry

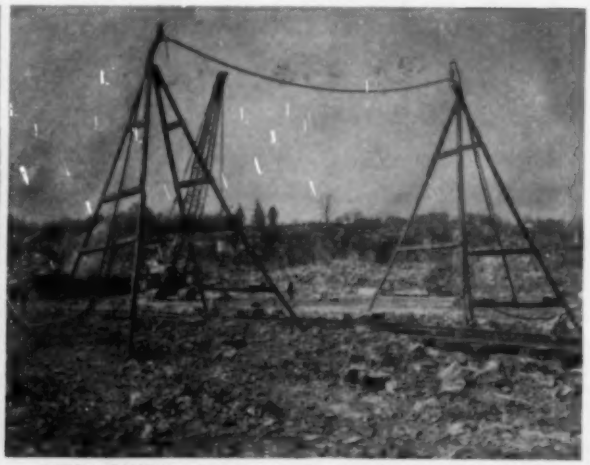
"Our *Tiger Brand*



NOTICE THE CABLE TRAY fastened to the shovel. This was developed by Universal Atlas for easier cable handling.



TWO WORKMAN WATCH from blast shelter as charge is set off in distance. Low horses cushion cable from shock of falling rock.



HERE A CABLE is raised on horses to clear the railroad track. It feeds the shovel visible in background.

Amerclad lasted 12 years"

Says Chief Electrician, Hudson Plant
Universal Atlas Cement Company

Year after year, at this quarry, the Amerclad is exposed to knife-sharp fragments of flying rock. During the summer, the rock often gets so hot that you can't even touch it. Other times, the cable lies out in the rain and snow—often at sub-zero temperatures.

At the Hudson, N. Y. quarry of Universal Atlas, Chief Electrician Frank Rodmond said, "This Amerclad runs the constant danger of being hit with flying rock fragments through secondary blasting. Yet the down-time cost of this operation is so high that we just can't stand cables that keep failing. We kept that last batch of Amerclad 12 years before we replaced it, yet it was still serviceable when we switched over to new Amerclad."

If you want service like this, specify Amerclad the next time you need cable that can really take it. Amerclad is available in a great many sizes and constructions, with or without shielding. There is a type to power anything from a river dredge or mine locomotive down to a rough and tumble electric hand drill. *Send the coupon,* and get more information.

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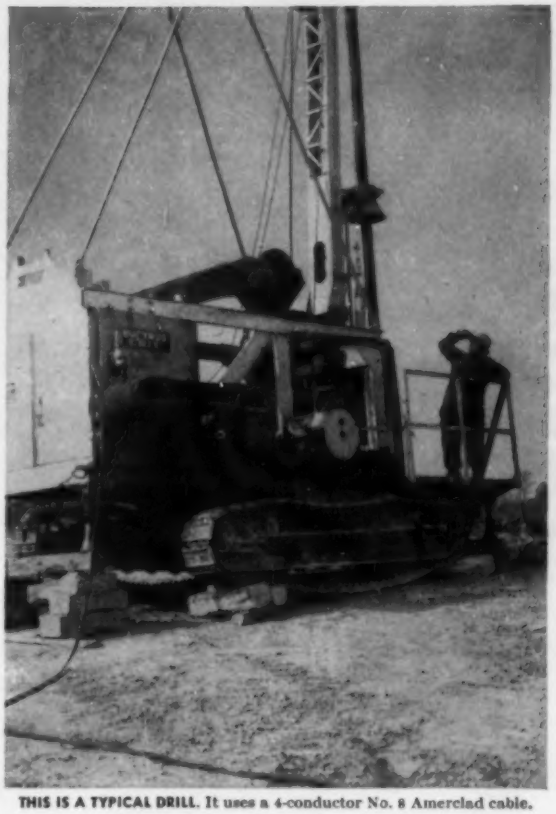

THIS IS A TYPICAL DRILL. It uses a 4-conductor No. 8 Amerclad cable.

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB!

paper & varnished cambric cable
asbestos wire and cable
aerial, underground & submarine cable
mold cured portable cord
machine tool & building wire
special purpose wire & cable
shovel & dredge cable

—SEND THE COUPON—

American Steel & Wire Division
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Cleveland 13, Ohio

☐ Please give me more information about Amerclad.
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U·S·S Tiger Brand ELECTRICAL WIRE & CABLE

USS

UNITED STATES STEEL

JEFFREY 81-A crawler loader

high in production . . . low on maintenance

Powered by Jeffrey 15 HP head and traction motors, the 81-A Crawler Loader sets a new pace in coal mining — a fast, easily maneuvered, highly productive machine, with design emphasis on simplicity and unit construction.

Now . . . for medium-low coal . . . the 81-A is available in two heights. You'll like the way it hits its stride quick and holds steady with peak performance. Rated capacity is 8 TPM; maximum capacity is 10 TPM.

Check a few of the engineering details — features which combine high production and low maintenance to make the 81-A today's best loader buy:

GENERAL — The 81-A is extremely well balanced. Machine is 6'2" wide, 23'8" long and weighs 19,500 lbs.

MOTORS — Four rugged Jeffrey 15 HP motors plus a 4 HP hydraulic pump motor give the 81-A a total punch of 64 horsepower — ample power for the toughest jobs.

HEAD — Gathering head is fully gear driven . . . no chain drives between head motors and gathering arms.

TRACTION — The 81-A trams at 137 FPM for quick moving from place to place. Jeffrey chain used for traction drive.

JEFFREY 81-A CRAWLER LOADER

CONVEYOR—Jeffrey articulated chain hits a speedy 356 FPM. Conveyor will swing 45 degrees either side of center . . . will elevate to properly load shuttle cars on the straight or in breakthroughs.

MAINTENANCE—Here's another bonus with the 81-A. Head and traction gear parts are interchangeable between left and right hand sides. Every motor and gear case is a separate, detachable unit. Simplicity and unit construction throughout mean fast replacement, low maintenance costs.

THE JEFFREY 81-B—The Jeffrey 81-B Crawler Loader has the same design specifications as the 81-A, except Jeffrey 10 HP head and traction motors are furnished instead of 15 HP. The 81-B has a rated capacity of 6 TPM and a maximum capacity of 8 TPM. Tram speed is 114 FPM. For lower initial cost, ask about the 81-B. Two heights available.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

IF IT'S MINED, PROCESSED OR MOVED
. . . IT'S A JOB FOR JEFFREY!

"Holding Power" is an interesting new industrial film which tells the complete story of fasteners. It describes common, everyday fastener items, such as bolts, nuts, rivets, track bolts and spikes, and shows how important they are to our modern way of life. The film also includes roof bolts, high-strength bolts, oil-well sucker rods, and a wide range of ingeniously designed special bolts.

"Holding Power" is in color, with sound. It is on 16 mm film, and runs about 25 minutes.

The film is intended not only for those closely associated with the fastener field, but also for general-type audiences. There is no charge for this educational picture, except for return postage. If you would like to use a print, write fully to Room 1021, Publications Department, Bethlehem Steel Company, Bethlehem, Pa., preferably well in advance of your showing date.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Tonnage per man high enough?

Costs per ton low enough?

MAKE SURE WITH A

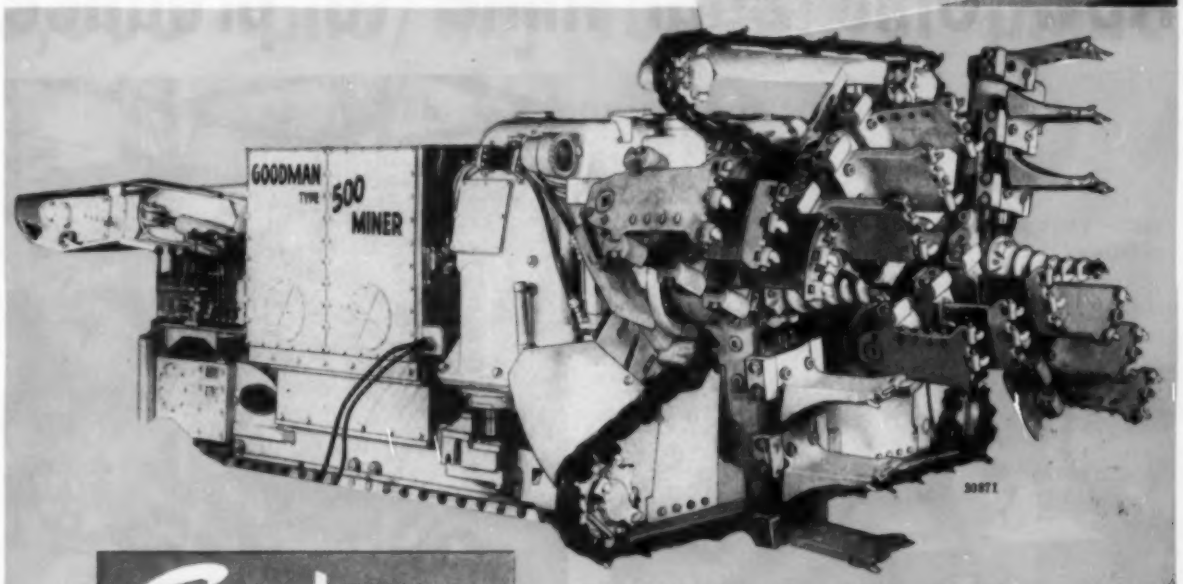
GOODMAN

Boring Type Continuous Miner

Goodman boring type miners are available for either low or high seams. Each machine combines a rated capacity of 7 tons per minute for full production work with a maneuverability suitable to all development work, including 90° crosscuts. In any mining system Goodman Miners promote concentration of workings that means fewer man hours and less supervision.

OUTSTANDING FEATURES OF GOODMAN MINERS

- cut a wide, high path in a continuous, straight line advance with no swing or maneuver. Bottom is wide and flat, sides and top corners arched for good roof support.
- produce high percentage of coarse coal.
- follow seam irregularities by vertical or sideways tilt of cutting element.
- cutting units retract for tramming clearance at top, bottom and sides.



Goodman Type 500 for 7′ to 8′ coal. Cuts a 13′ wide path, 7′ high.

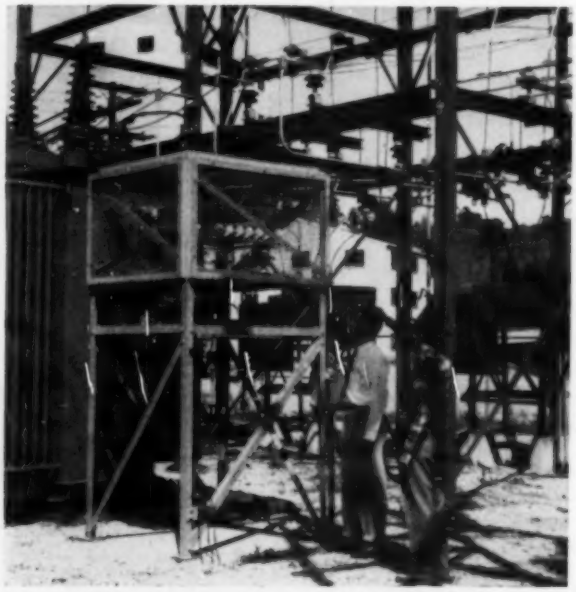
Goodman
MANUFACTURING COMPANY
HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

Cutting Machines • Conveyors • Loaders • Shuttle Cars • Locomotives • Continuous Miners

MINIMUM CYCLE TIME on this huge shovel—bucket capacity, 45 cubic yards—and other three shovels at mine is accomplished with help of pin-point control of G-E amplidyne system. Dependable G-E motors and motor-generator sets power shovels.

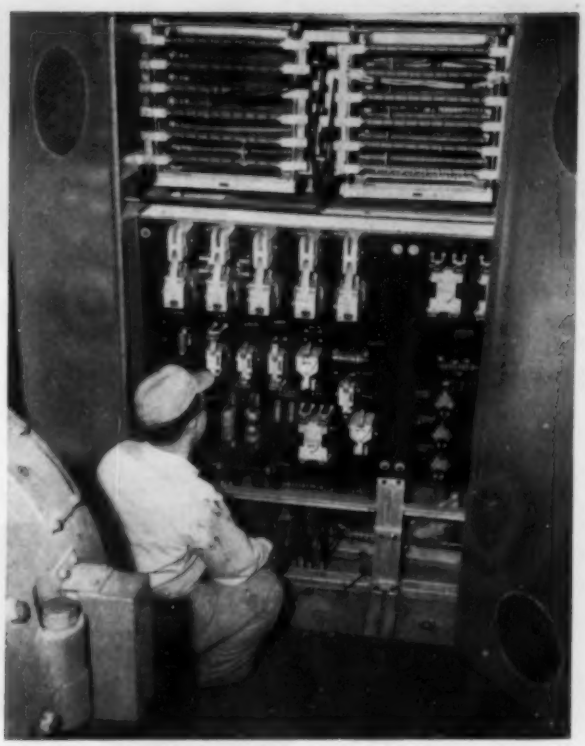
New Ohio coal mine to produce

ON-THE-SPOT CONTROL OF ENTIRE MINING OPERATION is provided by G-E 2-way radio system from Zanesville headquarters, 48 miles away. Result: outage time is kept low.



MINIMUM POWER LOSSES with this G-E substation which is located near work area. Neutral grounding assures minimum shutdown, maximum protection for personnel and equipment.

ROUND-THE-CLOCK SHOVEL OPERATION—thanks to this five-unit G-E motor-generator set. Split frames of m-g sets, specially designed for shovels, assure ease of maintenance.



INSTANTANEOUS CONTROL of shovels' hoist, swing and crowd motors provided by G-E amplidyne control. System uses fewer components, guards against torque peaks.

5,000 tons/day for power plant

General Electric equipment to help Muskingum mine reach peak output

The new Muskingum Mine, Morgan County, Ohio, soon will be furnishing 5000 tons of strip-mined coal per day to the Ohio Power Company's nearby Muskingum River Plant. In a continuous stream, the coal flows from the mine through the preparation plant, and then to the power station.

Four shovels—all powered and controlled by G-E equipment—are used at this mine. Two of them—one with a bucket capacity of 45 cubic yards—will handle the overburden to a projected highwall of 80 feet. The two smaller shovels load the coal. A G-E equipped substation provides power for the shovel operation.

To integrate the mining, processing production, the mine's Zanesville headquarters—48 miles away—uses a G-E two-way radio system. Eight units are located in the shovels, dispatch cars, and mine office.

You can take advantage of the same expert G-E electrical engineering that went into this system, no matter how large or small your mining project may be. When you specify General Electric, its many specialized services—product development, system engineering, field engineering, to name but a few—are available to you. Your local G-E Apparatus Sales Representative can tell you more. General Electric Co., Schenectady 5, New York. 660-40

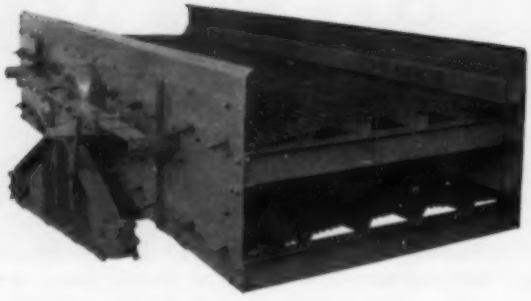
Engineered Electrical Systems for Coal Mines

GENERAL ELECTRIC

HEWITT HR ROBINS can cut your handling costs

with this complete

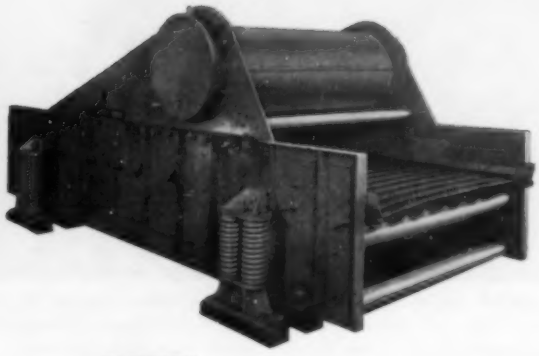
FOR SCREENING



GYREX°

Positive Stroke 4-Bearing Screens

STROKES: ¼" at 1,000 r.p.m. and ½" at 625 r.p.m.
SIZES: Complete range of standard sizes from 48" x 78" to 72" x 192".
DECKS: Single—Double—Triple.
MOUNTINGS: Anvil-type cast iron base with *exclusive angle adjustment* for floor mounting—Steel I-beam base for suspended or rigid mounting.



ELIPTEX°

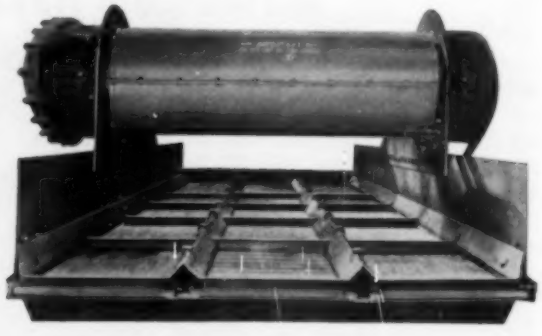
Horizontal Operating Flat Screens

STROKES: 7/16" nominal at 1,000 r.p.m.—Other stroke and speed combinations available to meet special applications.
SIZES: All standard sizes from 36" x 96" to 72" x 240".
DECKS: Single—Double—Triple.
MOUNTINGS: Floor mounted or Suspended arrangement.

VIBREX°

Full-Floating, Unbalanced Pulley-Type 2-Bearing Screens

STROKES: Available in many stroke and speed combinations ranging from ¼" at 1,800 r.p.m. to ½" at 660 r.p.m. —All Vibrex screens have readily adjustable stroke to meet the most exacting operating conditions.
SIZES: All standard sizes from 16" x 30" to 72" x 192".
DECKS: Single—Double—Triple.
MOUNTINGS: *Exclusive angle adjustment* for floor mounting —Cable arrangement for suspended mounting.



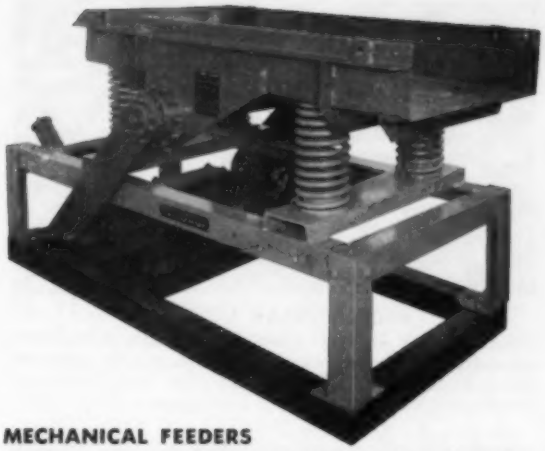
ELIPTEX DEWATERIZER

Specially Designed Eliptex Screen With Micron-Size Opening Stainless Steel Flat Rod Deck

STROKE: Extra-full stroke operating at high speed for maximum efficiency to handle even the most difficult dewatering problems.
SIZES: All standard sizes from 36" x 144" to 72" x 192".
DECKS: Single—Double.
MOUNTINGS: Same as Eliptex Screens.

line of Vibrating Equipment

FOR FEEDING & CONVEYING



MECHANICAL FEEDERS

A *fully mechanical* vibrating feeder that is easily maintained by your own personnel. Extremely high capacities at very low power consumption.

FEED CONTROL: Remote, wide range, variable speed controls available.

STROKE: Full 3/16" at 1,000 r.p.m. readily adjustable . . . ideal for handling material of varying characteristics.

SIZES: All standard sizes from 24" x 48" to 48" x 96".

MODELS: Standard—Heavy duty models and special pans and deck designs available . . . suspended or base mountings.

VIBRATING CONVEYORS

A continuously balanced vibrating conveyor offering longer units with higher capacities at lower horsepower than ever before available. Ideal for handling a wide range of materials be it wet or dry, lump or pulverized, packaged or loose, hot or cold, abrasive or corrosive.

SIZES: Standards from 8" to 48" wide up to 150' long with single drive.

STROKE: Full strokes from 1/4" to 3/8" at speeds of approximately 750 r.p.m.

MODELS: Standard—Heavy duty models and special pan designs and arrangements available.

FOR SHAKING OUT

CAR SHAKEOUTS

Will handle wet, compacted and even partially frozen loads. Capacities vary depending upon characteristics of material . . . Typical unloading time under 5 minutes per car.

MODELS: 5-Ton HD (Heavy-Duty) for handling up to 100 cars per day—3½-Ton GS (General Service) generally recommended for up to 10 cars per day. Both models available with companion twin-hook Car Shakeout Hoist.

STROKE: 5/32" at 1,500 vibrations per minute (easily adjusted for specific applications).

Patent No. 2,504,789

FOUNDRY SHAKEOUTS

Successfully used in steel, iron and non-ferrous foundries of all types (production and jobbing) handling castings weighing from a few ounces up to 60 tons.

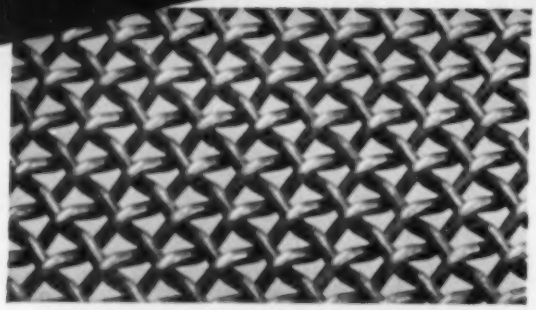
SIZES: From 2' x 2' to 8' x 10' in single units. Multiple unit arrangements up to 16' x 33'.

CAPACITIES: Up to 300,000 # (150 tons) in multiple units.

STYLES: Standard Stationary, Portable, Gravity Self-Discharging and Mechanical (Horizontal) Self-Discharging.

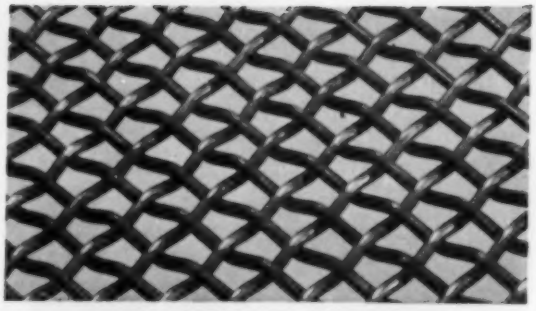
AND FOR YOUR SCREEN CLOTH NEEDS

HEWITT HR ROBINS can cut your handling costs with a complete



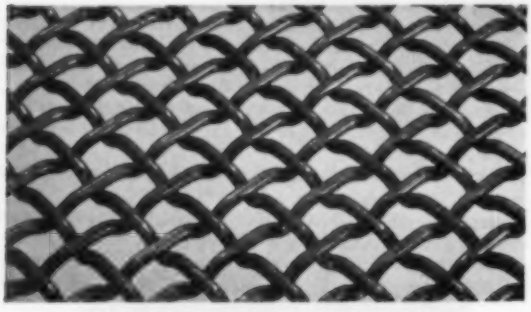
SQUARE OPENING DOUBLE CRIMP

All wires are specially crimped so that a spring tension permanently locks them together at each intersection. This guarantees tightness of weave and accurate sizing because openings cannot vary.



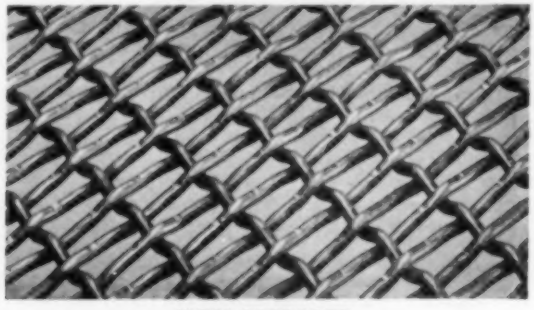
RECTANGULAR OPENING

Recommended for high speed sizing where accuracy is secondary. Rectangular weave provides greater open area hence higher capacity. Furnished with double crimp or flat top weave.



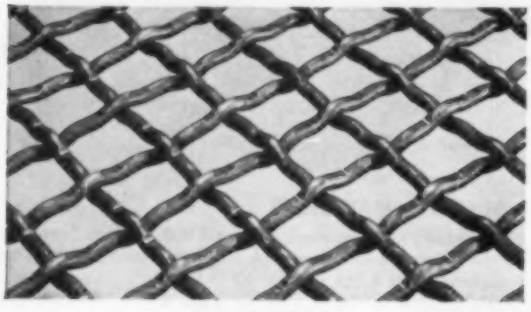
SQUARE OPENING LOCK CRIMP

Ideal for scalping. Has additional crimp to lock wires together under pressure to prevent wires from shifting as a result of impact and handling of oversize materials.



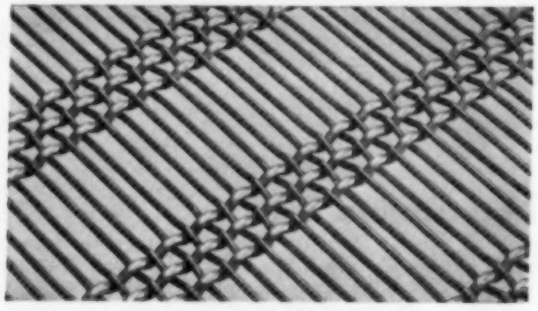
NON-SPREADER

Best for high speed sizing of coarse materials. Heavy-duty wires assist in maintaining accuracy of opening even under impact of wedge-shaped stone and over-sized materials.



FLAT TOP

Crimp characteristics provide smooth screening surface. Absence of high spots, as in other types of crimp, permits free flow and reduces abrasive action of material. Assures longer wear, faster screening and less degradation.



NON-BLIND

Recommended for processing moisture-laden materials that plug or blind openings. Slotted openings kept free from blinding due to secondary vibration set up in longer span wires. Clustered wires carry heavy tension and are crimped to maintain width of opening.

line of Screen Cloth

Each Type of Hewitt-Robins Screen Cloth is Specially Engineered To Accurately Size Large Tonnages . . . Last Longer . . . Cut Your Screening Costs

Hewitt-Robins Screen Cloth guarantees overall sizing accuracy through precision-weaving of individual screen cloth wires. You get longer service because Hewitt-Robins utilizes a full range of metals in its selection of wire to assure that each panel of screen cloth is matched to meet individual job requirements. Types of wire range from genuinely oil-tempered through spring steel, stainless steel, enamel-coated and on to special alloys of extraordinary corrosion and heat resistant properties.

In specific installations where the more abrasive materials such as coke, iron ore, stone, gravel and coal are handled, specify Hewitt-Robins Super-Gyraloy. It's the specially treated oil-tempered wire that combines hardness—stiffness—elasticity—ductility—toughness . . . and must pass exacting laboratory tests for uniformity of these properties.

For operations involving a dust factor aggravated by moisture (as in sizing fine coke and iron ore) specify Hewitt-Robins Super-Gyraloy Enamel Coated Screen Cloth. The enamel coating prevents the build-up of the blinding compound . . . protects the surface against moisture and averts oxidation of the metal.

Where initial cost is of primary consideration and abrasion is not excessive, Hewitt-Robins Gyraloy® spring steel screen cloth provides maximum efficiency and economy. For special applications Hewitt-Robins Screen Cloth comes in plain or galvanized steels, brass, phosphor-bronze, Monel and other ductile alloys.

Hewitt-Robins Screen Cloth is available in standard production size openings from 3/16" and coarser . . . wire sizes from .105" diameter up to and including 1" diameter.

For complete information regarding the kind, type and opening of Hewitt-Robins Screen Cloth to best fit your operation . . . give you highest screening efficiency at lowest cost per ton . . . contact Hewitt-Robins Incorporated, Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey, or your nearest Hewitt-Robins representative.

HEWITT HR ROBINS

Executive Offices, Stamford, Connecticut

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam

FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • **EXPORT DEPARTMENT:** New York City.

QUESTION* **How much more material is there in a Three-Inch-Higher Windrow . . . 9% . . . 18% . . . 31% . . . ?**

Cross section of an average, 21-inch high windrow . . . the area (width x height ÷ 2) is 614 sq in.

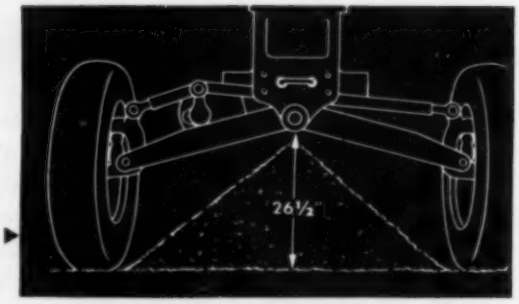
Now increase the height of the windrow by 3 in. The cross-section area now equals 804 sq in.

The difference: 190 sq in, over 30 percent more area, meaning over 30 percent more yardage.

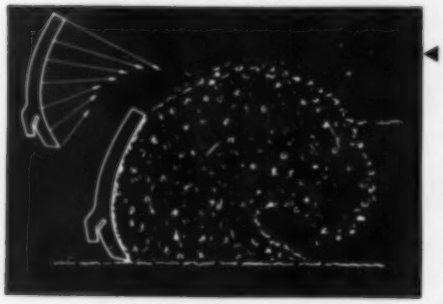
*Only a Combination of Advanced Design Features Lets a Motor Grader Handle Big Loads Fast

To take full advantage of even a *three-inch* difference in windrow height (as explained above) a heavy-duty motor grader needs new design and performance characteristics from front to rear and top to bottom.

Let's analyze the Allis-Chalmers 104-brake-horsepower AD-40 to see how it measures up to these stiff requirements.

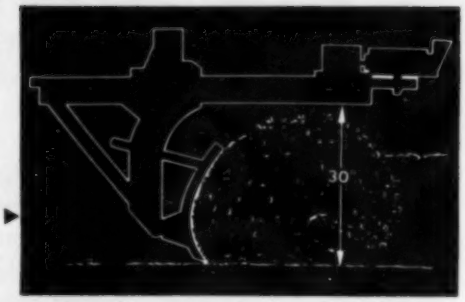


1 **A HIGH-ARCH FRONT AXLE** to straddle big windrows . . . take advantage of that three-inch difference and let big loads pass through to the blade.



2 **A ROLLING-ACTION MOLDBOARD** . . . to insure a "live" load that rolls freely off the blade . . . moves the load faster and takes full advantage of engine power.

3 **AMPLE THROAT CLEARANCE** . . . to handle 30 percent bigger loads without disturbing free, rolling action . . . and without jamming dirt, oil-mix or any other material against the circle.



4 **FULL BLADE FREEDOM** . . . the exclusive tubular frame and a long tubular drawbar insure full blading effectiveness on the road, in the ditch or on the slope.

5 **BALANCED POWER, WEIGHT AND TRACTION** . . . a heavy-duty engine and *two-thirds* of the weight concentrated on tandem-drive rear wheels provide the best in traction, positive blade pressure and steer-ability.

6 **EASY CONTROL AND VISIBILITY** — A big platform with plenty of leg room, adjustable seat and steering wheel, power steering, assures working ease. Single member frame, low control board and tapered platform corners provide "pilot-house" visibility.

Your Allis-Chalmers dealer will be glad to show you how the AD-40 gives you the *differences* that mean more work done . . . by a demonstration under on-the-job conditions.

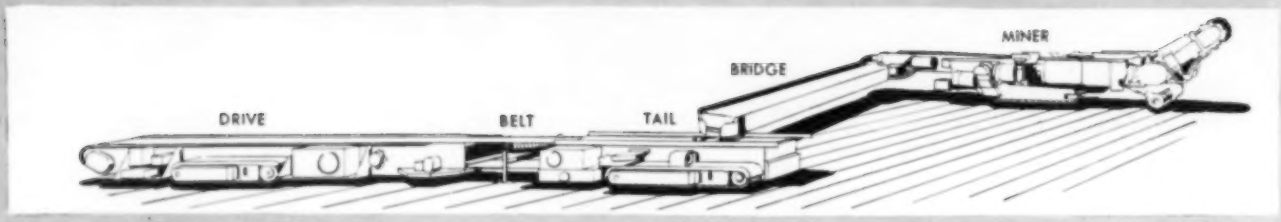
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ANOTHER JOY FIRST!

NOW— FOR THE FIRST TIME—
YOU CAN GET A PRODUCTION UNIT
THAT PROVIDES CONTINUOUS HAULAGE
FROM CONTINUOUS MINING MACHINES

JOY EXTENSIBLE BELT CONVEYOR

COMPLETELY FIELD-TESTED
AND PROVED BY 5 YEARS OF
RESEARCH, INCLUDING
3 YEARS UNDERGROUND SERVICE



JOY E-X-T-E-N-S-I-B-L-E BELT

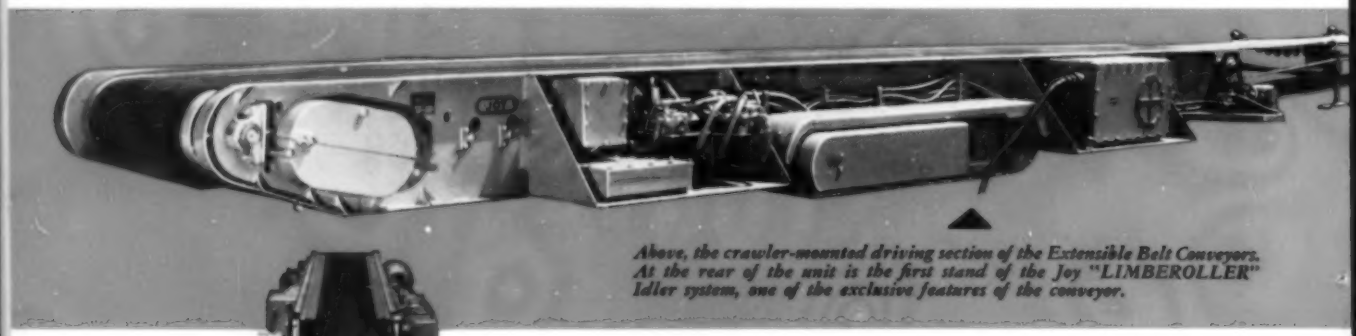
EXTENDS OR RETRACTS UNDER FULL LOAD FOR CONTINUOUS HAULAGE FROM CONTINUOUS MINING MACHINES

Operating Highlights

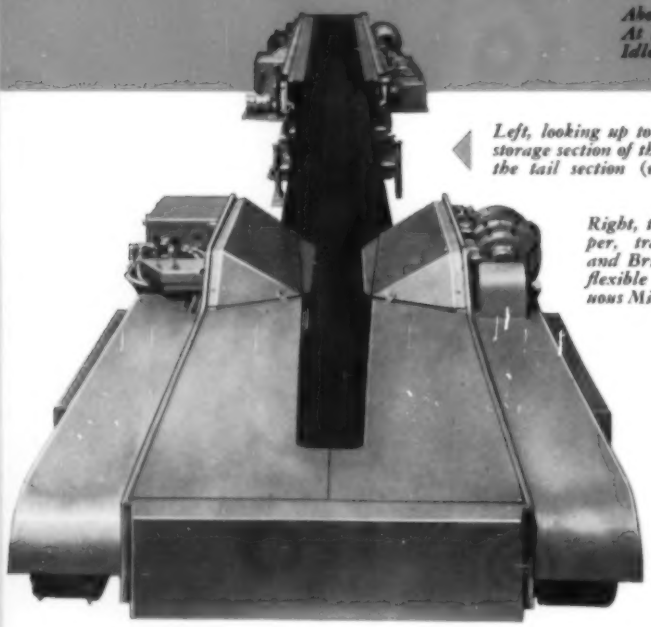
With the Joy "Ex-Belt" Conveyor, once again we have broken into new ground in our continuing development of the science of mechanized mining. Once again a Joy field-proved unit gives you a real opportunity to make another important reduction in your production cost-per-ton . . . the saving you need to maintain or increase your profit margin today.

The Extensible Belt Conveyor now, *for the first time,* gives you a continuous haulage system for Continuous Miners in driving rooms and entries up as far as 1,000 feet, including breakthroughs and taking pillar on retreat. Available in 24″, 30″ or 36″ widths, it consists of two main units: a driving section and a tail section, both of which are self-propelled on identical crawler treads. It extends or retracts 50 feet while operating under full load, and belt tension and slippage are under automatic control at all times. A 100-foot length of belt can be added or removed, as needed, in an average time of only 5.3 minutes; and the entire system can be moved over and set up for a new heading in less than 2 hours.

Perhaps most important of all, the Extensible Belt Conveyor follows the Joy tradition of simply-designed, rugged, foolproof equipment that can take the heaviest duty underground and stay on the job month in and month out. That is your final assurance of securing the favorable cost basis and production rates for which the Joy "Ex-Belt" was developed.

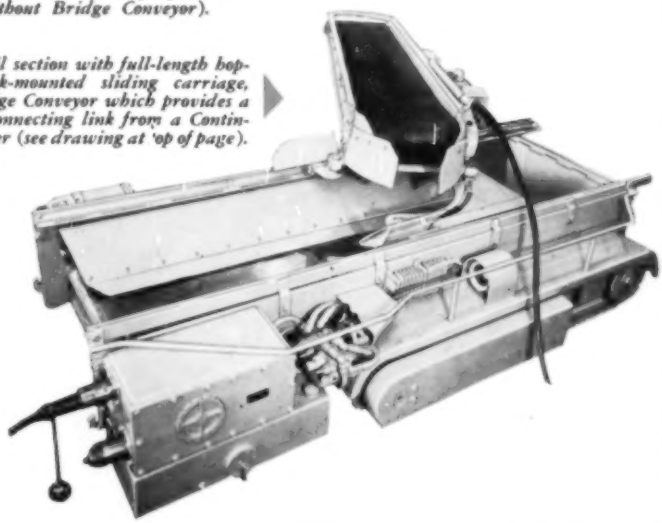


Above, the crawler-mounted driving section of the Extensible Belt Conveyor. At the rear of the unit is the first stand of the Joy "LIMBEROLLER" Idler system, one of the exclusive features of the conveyor.



Left, looking up toward the driving and belt storage section of the "Ex-Belt" Conveyor from the tail section (without Bridge Conveyor).

Right, tail section with full-length hopper, track-mounted sliding carriage, and Bridge Conveyor which provides a flexible connecting link from a Continuous Miner (see drawing at top of page).



JOY PIONEERED CONTINUOUS MINING

Now we pioneer

CONTINUOUS HAULAGE

Advantages

FAST, CONTINUOUS HAULAGE IN LOW OR HIGH COAL

The Joy Extensible Belt Conveyor is available in 24″, 30″ and 36″ belt widths, for peak capacities ranging from 180 to 440 TPH in driving rooms or entries to depths of as much as 1,000 feet.

All models are of permissible construction throughout, and are only 26″ in overall height.

SIMPLY DESIGNED FOR MAXIMUM DEPENDABILITY

Only three motors are employed in the "Ex-Belt" Conveyor (another in the Bridge Conveyor when it is added to the system). This simplicity of design reduces outages for motor service and repairs; cuts down maintenance costs; combines with other construction features to give you foolproof continuous haulage.

INCREASED MINING MACHINE CAPACITY

Use of the Joy "Ex-Belt" for continuous haulage definitely means less Miner downtime; better use of its productive capacity; greater return on the Miner investment and more tonnage per shift.

COMPLETE FLEXIBILITY

A rugged, one-piece Bridge Conveyor serves as a flexible connecting link between the "Ex-Belt" and the Continuous Miner. Combined with the articulating rear conveyor of the Miner, it permits wide freedom of movement and enables the operator to mine breakthroughs and extract pillars while advancing or retreating without interrupting the continuous flow of coal.

MINIMUM DELAY TIME

The Joy "Ex-Belt" extends or retracts for 50 feet while operating under full load. Idler stands are added or withdrawn while the belt is in full operation.

The 100-foot length of belting for the next 50 feet of movement can be added (or removed) in as little as 3 minutes and usually less than 8 minutes (5.3 minutes average in field time studies). A power drive does the work, making handling fast and effortless; and the extra belt is always added or removed at the room neck, meaning that minimum handling of the belt lengths is required.

MINIMUM HEADING TRANSFER TIME

With the power-propelled head and tail sections of the Extensible Belt eliminating "dead work," this entire continuous haulage system can be dismantled and set up for a new heading in 2 hours or less (note the 1¾-hour time study below).

FIELD-DEVELOPED ENGINEERING DETAILS

The head has a tandem drive with vulcanized, herringbone lagged pulleys, and an automatically-tensioned, multiple-loop takeup which holds 100 feet of belt. It pays out belt on advance; takes it up on retreat.

The tail section of the Conveyor extends the belt. An automatic signal device warns when the length in storage is coming to the end. The tail has a permissible power takeoff for a traveling bridge conveyor, and is available either with a hopper and track to carry a bridge conveyor, or with an adjustable hopper only, for use when taking coal from shuttle cars or portable conveyors.

Both head and tail sections are self-propelled, mounted on hydraulically-powered crawlers for easy mobility. The crawler units are identical, and all parts are interchangeable. Each is self-contained, with its own hydraulic system.

These are just a few of the cost-saving advantages built into the Joy Extensible Belt Conveyor. ● Let us help you to work out a haulage system that can help *your* profit picture. ***Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

TYPICAL EXAMPLE of using the Joy Miner—Extensible Belt—Bridge Conveyor combination

Operation:	Driving room 5′ high, 16′ wide on 25′ centers to a depth of 600′.
Move Complete Setup to Next Room:	1¾ hours; actual time from stop of coal flow in one room until coal once again moving in a continuous stream in next room. Complete setup ready in time required to move Miner alone.
Outages due to Haulage:	Approximately 60 minutes total for adding belt lengths to Conveyor.

W&D CL 5234

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

THE JOY "EX-BELT" CONVEYOR IS A TESTED, FIELD-PROVED UNIT

Looking from right to left in the illustration at left, the tail boom of a Joy Continuous Miner dumps the coal on the belt of the Bridge Conveyor below it, which in turn transports the coal in a steady flow to the hopper on the tail section of an Extensible Belt Conveyor . . . for true continuous haulage in continuous mining.

As the Continuous Miner advances while mining a room of 16-foot width, a continuous stream of coal moves away from the tail section and up the "Ex-Belt" Conveyor toward the camera. Note the perfect troughing of the belt and the smooth, steady action of the LIMBEROLLER idlers, rotating with practically no waver. Along the rib, note how the required idler stands and side rails for a 15' section of the belt stack compactly between timbers.

At left, a view along the belt toward the Drive section of the conveyor located at the room neck, where the coal is transferred to the main haulage system. Each of the steel reels along the rib carries a 100' roll of belting, which is added or removed at this fixed point by power. Note also the simple, easy-to-handle construction of conveyor sections.

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

OLIVER BUILDING • PITTSBURGH 22, PA.

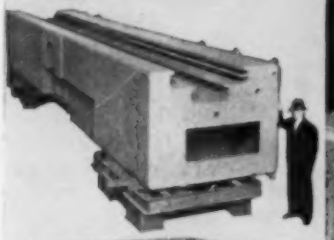
In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

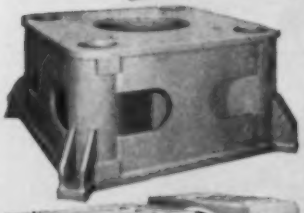
W&O CL 5235

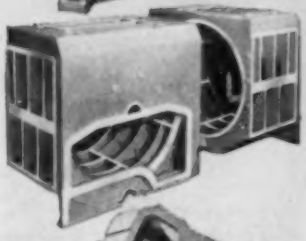
JOY

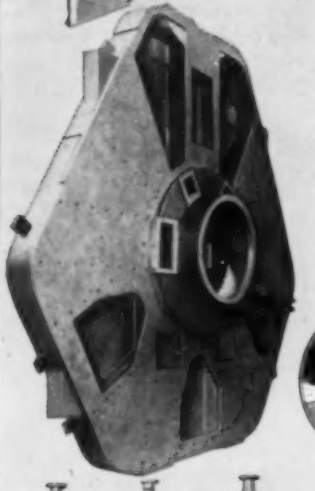
WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

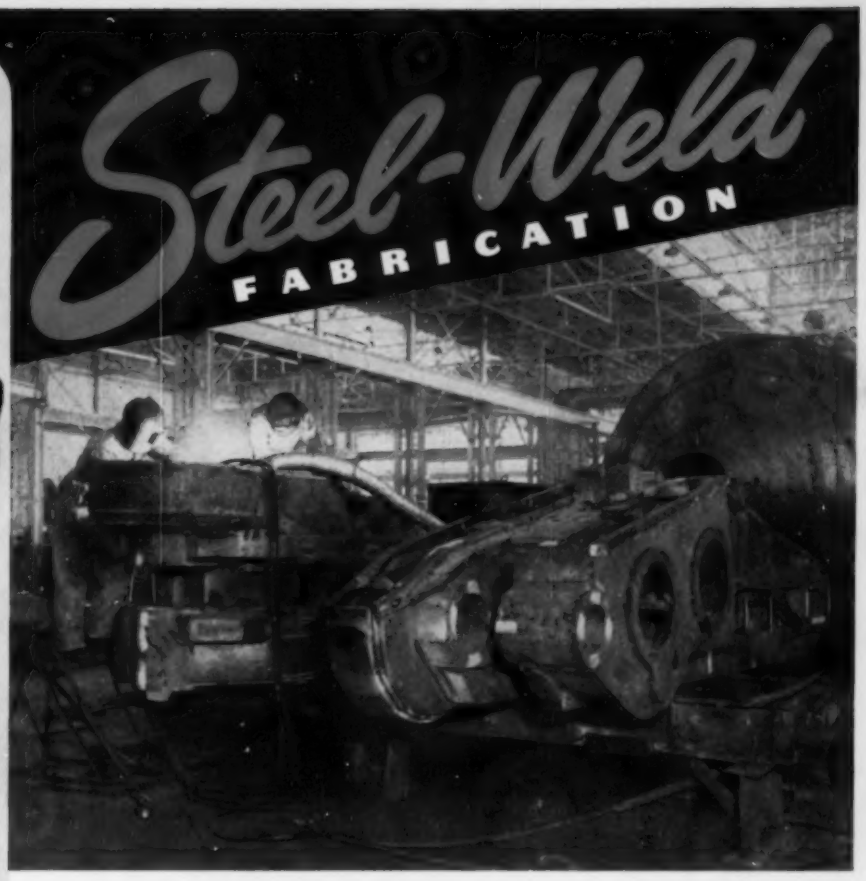
Steel-Weld FABRICATION











Use WELDED STEEL for Greater Strength with Less Weight!

The Crawler Side Frames illustrated above, parts of a large strip mining machine which were formerly produced in casting form, were redesigned and produced by Mahon as weldments. These and the parts and assemblies shown at the left are typical of thousands of Steel-Weld Fabricated units produced and machined by Mahon for hundreds of manufacturers of processing machinery, machine tools and other types of heavy mechanical equipment. If you require welded steel parts, assemblies, or special purpose equipment, you can turn to Mahon with complete confidence . . . highly skilled personnel are available within the Mahon organization to do the complete job from drawing board to finished machining and assembly—thoroughly experienced personnel who are backed by tools and plant facilities with capacity to produce virtually anything in welded steel construction regardless of size or weight. You will find in the Mahon organization a unique source for Steel-Weld Fabrication . . . a source where skillful designing, advanced fabricating techniques and superior craftsmanship assures you a smoother, finer appearing job embodying every advantage of Steel-Weld Fabrication. See Mahon's Insert in Sweet's Product Design File, or have a Mahon engineer call and give you complete information.

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

new!

ATLAS *Shotmaster* BLASTING MACHINE

The first condenser discharge type blasting machine utilizing a high voltage DC generator directly connected to charge the condensers.

Dependable blasting starts with a dependable blasting machine. And this new Atlas blasting machine is designed to give you every advantage in dependability and safety.

Hand actuated generator operation does away with battery replacements and gives consistent voltage in both hot and cold weather.

Built-in Volt Meter shows actual voltage while the condensers are being charged.

Adequate voltage assured. The condensers cannot discharge into the firing circuit below a predetermined voltage.

No danger of a residual charge in the condensers. With the condensers connected directly to the generator, any residual charge is dissipated quickly.

Simplified operation. The generator is hand operated. The firing trigger may be closed or open during the voltage build-up. Only when the voltmeter needle indicates optimum power can the firing circuit be activated.

Waterproof. The entire unit is sealed and the switch is waterproof. The new Atlas blasting machine is always ready to go . . . under all conditions.

Sturdy, welded steel case is compact and easy to handle. The whole machine weighs only 30 lbs.

Insulated-type terminals. Binding post screws are made of a non-conducting material. Terminals are well separated for maximum safety.

For complete information on this new blasting machine, get in touch with your Atlas representative. He will be glad to give you full details and arrange a demonstration if you wish.

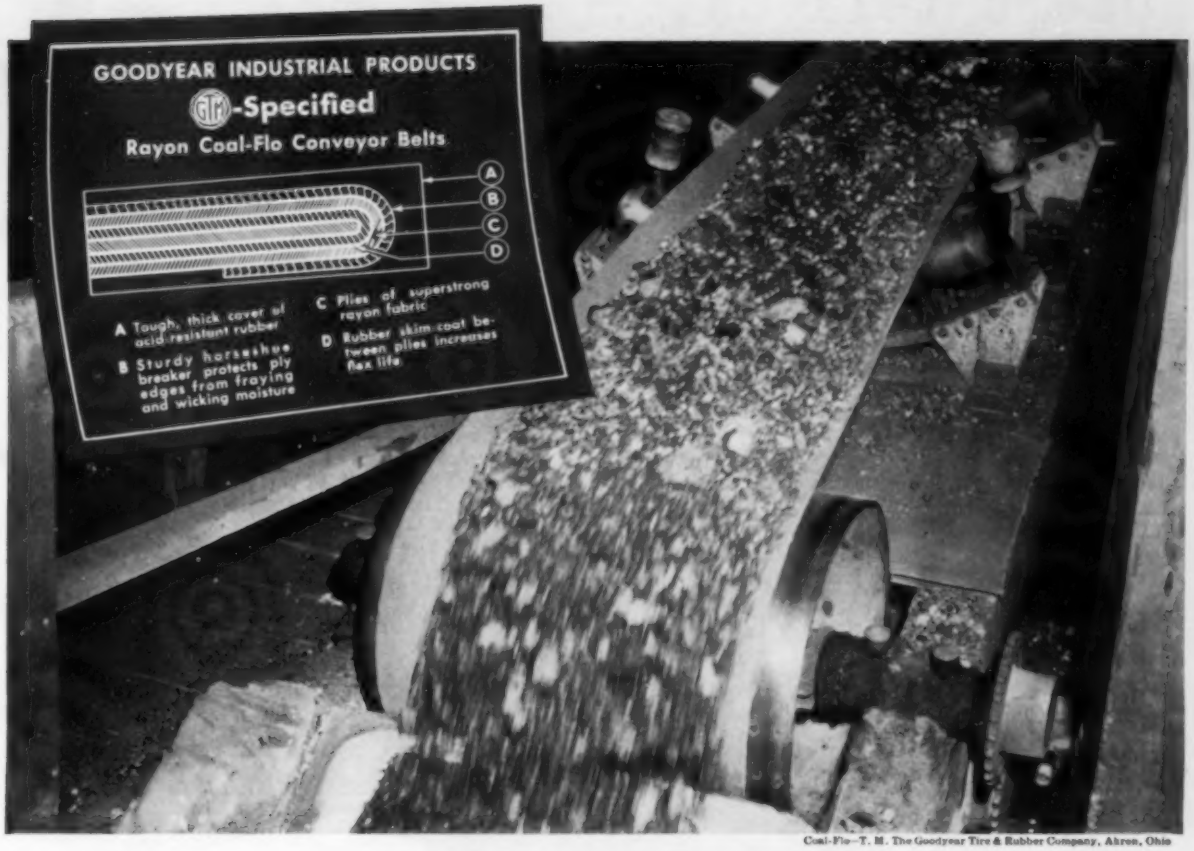
ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY,
WILMINGTON 99, DELAWARE

Offices in principal cities


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
Rayon Coal-Flo Conveyor Belts
A
B
C
D
A Tough, thick cover of acid-resistant rubber
B Sturdy horseshoe breaker protects ply edges from fraying and wicking moisture
C Piles of superstrong rayon fabric
D Rubber skim-coat between piles increases flex life

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

WHY RAYON

in COAL-FLO CONVEYOR belting?

BALANCED construction. Troughability superior to belts with 25% less tensile strength. 20%-60% greater fastener-holding ability. Up to 50% less stretch. 30% less thickness. 37% less weight. Higher tear resistance. These are the reasons why COAL-FLO conveyor belts are built with rayon.

The rayon duck used in COAL-FLO belting is custom woven. Lengthwise and transverse cord strength is properly balanced. This eliminates variable stretch and strength characteristics that result in uneven tension distribution and accelerated fatigue. And the belt is thinner, stronger, lighter in weight for better flexing, less take-up and tearing, more pay load.

All this adds up to a longer haul at lower cost. Especially since the belt is thoroughly protected by an exclusive mildew inhibitor developed by the G.T.M.—Goodyear Technical Man—and fully proved in over 25 years' use. More details? Contact your Goodyear Distributor, the G.T.M. or Goodyear, Industrial Products Division, Akron 16, Ohio.

YOUR GOODYEAR DISTRIBUTOR

can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."

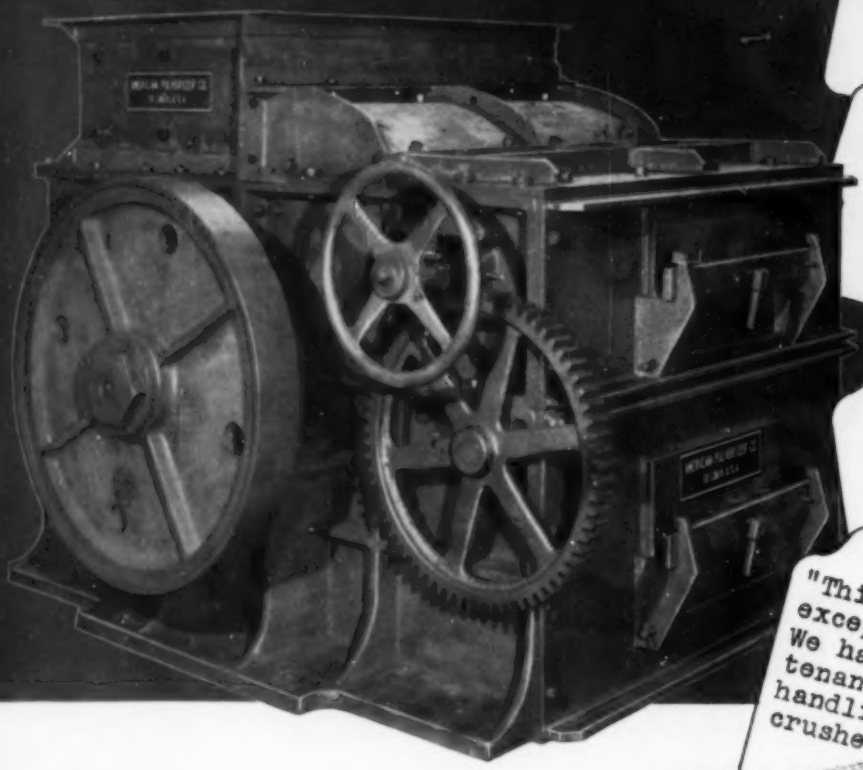
GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

users tell us...

AMERICAN COAL CRUSHERS GIVE GREAT PERFORMANCE AT LOW COST



"This machine has crushed 175,000 tons of coal without replacement parts"

"Has given the least trouble of any machine in our power plant"

"Very dependable piece of equipment"

"A reliable and well applied unit, consistently producing a uniform product"

"This crusher has been giving exceptionally good service. We have had very little maintenance. Does a better job handling wet coal than most crushers"

"We have never done any maintenance work on the crusher. It is still in very good condition with little or no evidence of wear. The repair parts we ordered are being kept in stock for future use"

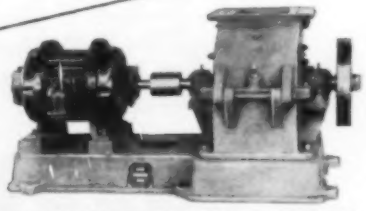
Performances in hundreds of mines, power plants and central stations have proved conclusively that American Coal Crushers can crush coal for *less than 1¢ per ton*, including depreciation, replacement parts, power and interest on original investment.

Write us today indicating your special needs in coal crushing equipment. We'll be glad to give recommendations and cost estimates.

When You Figure Cost Per Ton, the Best Answers Come From American

COAL CRUSHERS
Up to 800 TPH

SAMPLE CRUSHERS
To Suit Your Requirements

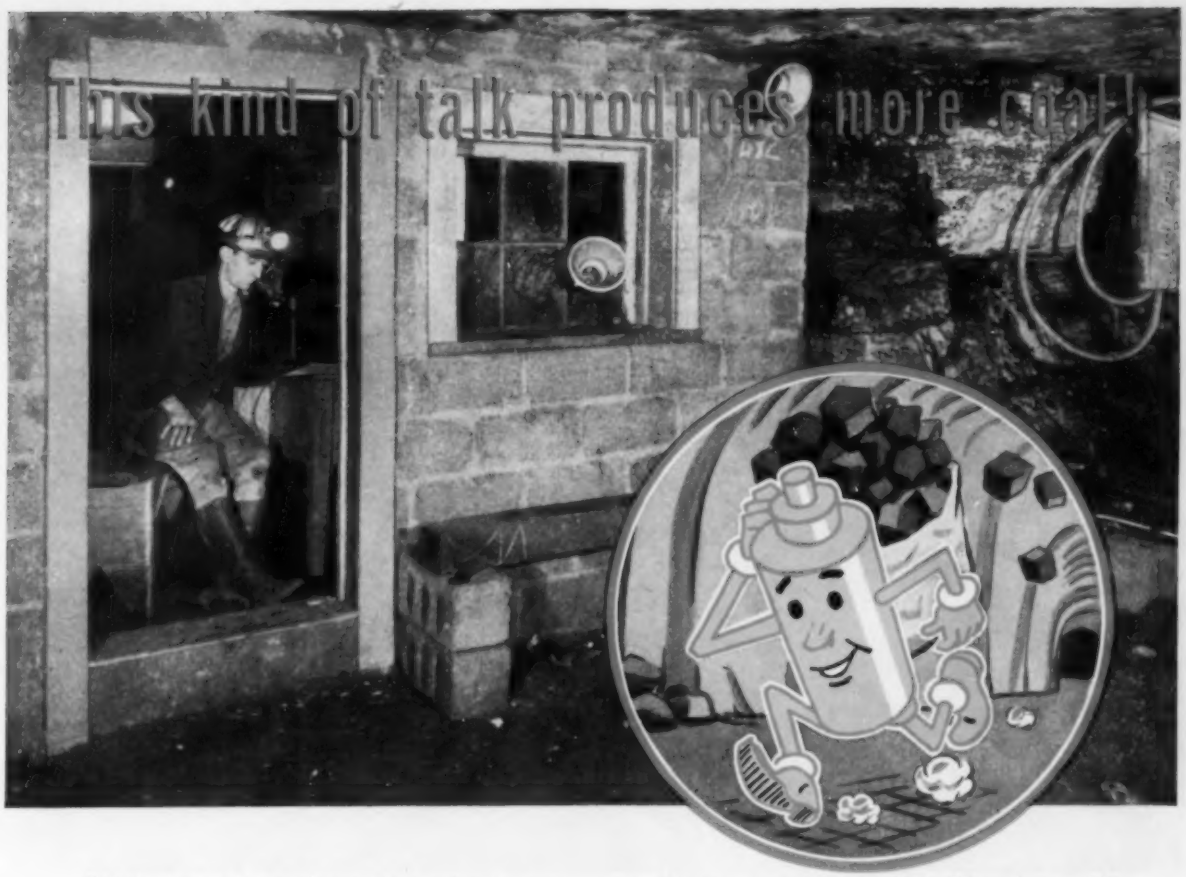


FOR LOW-COST COAL-SAMPLE CRUSHING
Model 15 x 9 American Sample Crusher for capacities up to 2000 lbs. per hr.

American
PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., St. Louis 10, Mo.



When your miners phone from mine to surface, or from place to place underground, they need instant, dependable communication. Noisy, undependable telephone cables hinder instead of help production.

Water probably causes more interference with satisfactory mine telephone service than anything else. Even a small amount of moisture finding its way into cables can cause interruptions in service.

You can get a special Simplex-ANHYDREX Telephone Cable that was made especially for mine service. It has two No. 16 conductors covered with Anhydrex insulation and protected by a neoprene jacket. Here is a cable you can depend on. Anhydrex insulation is noted for its resistance to moisture absorption, and for its electrical efficiency in telephone circuits.

If you prefer, multiconductor signal and communication cable can be furnished where many phone circuits are to run along together. They may be arranged in pairs, quads, or otherwise, as installation requirements indicate. Color coding and shielding may be supplied if desired. Resistant to acids, flame, and oils, Anhydrex-insulated, neoprene-jacketed cables are noted for ease of installation and low first cost.

Want to know more about how to get good telephone service? Ask for Catalog No. 1013. No obligation, of course.

Simplex–ANHYDREX

Telephone Cables

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

At U. S. Steel Corporation's New Fairless Works: **This conveyor belt is reinforced with Du Pont "Cordura" for greater strength . . . better troughing**

THIS CONVEYOR handles Blast Furnace coke size 4 inches and under from Crushing and Screening Station at Coke Plant to storage bins at Blast Furnace, covering a distance of about one mile.

A conveyor belt system that marks a new high in efficiency and flexibility feeds coke in a steady stream from the coke ovens to the blast furnaces of the Fairless Works of U. S. Steel Corporation at Fairless Hills, Pennsylvania. Shown above is the shuttle conveyor which receives coke coming from the coke ovens . . . moving back and forth under the big belt to distribute coke among several bins. This belt was manufactured by Goodyear Tire & Rubber Company.

The high strength of Du Pont Cordura* High Tenacity Rayon makes possible belting that's stronger, yet thinner, for better troughing and training. And the low stretch of "Cordura" reduces shutdowns for take-up and resplicing.

Before you order your next conveyor belt, inquire about the use of "Cordura" rayon in belts. We'll send you the names of suppliers . . . together with full information. Just write for your free copy of the new booklet, "Mine & Quarry Facts About 'Cordura'." Address: Textile Fibers Dept., Room 2528C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

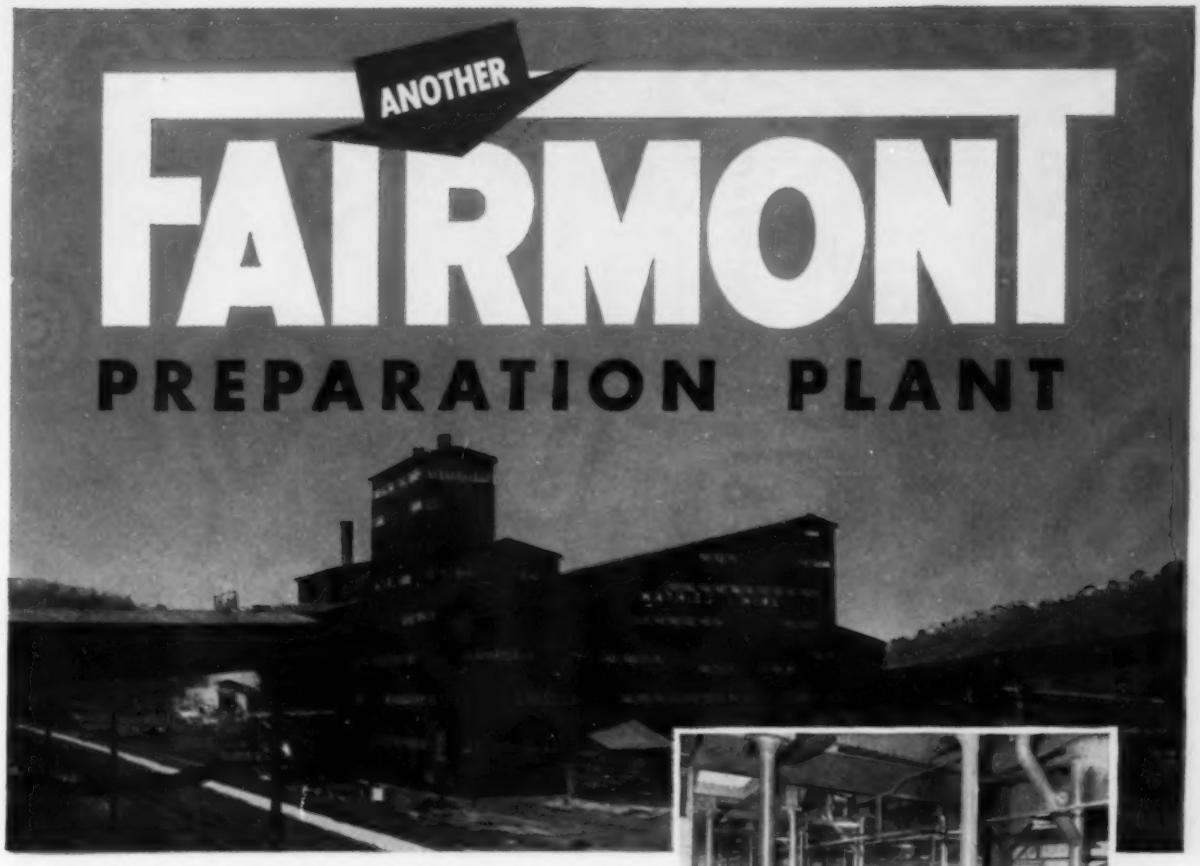
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ANOTHER

FAIRMONT

PREPARATION PLANT



FAIRMONT-BUILT PLANT AT MATHIES COAL COMPANY AT MONONGAHELA, PA. CAPACITY APPROXIMATELY 1000 TONS PER HOUR.

Something Extra

PARTIAL VIEW OF TWENTY-SIX DEISTER SUPER DUTY DIAGONAL DECK NO. 7 COAL WASHING TABLES USED IN ABOVE INSTALLATION FOR CLEANING 5/16" x 0 SIZE. NOT SHOWN ARE TWO 13'-6" DIAMETER CHANCE CONES FOR CLEANING 8" X 5/16" SIZE.

...in cleaning coal for by-product purposes

When coal must meet the exacting requirements of by-product purposes, Fairmont-built plants are designed to guarantee a day to day uniformity in ash and sulphur content.

Through coordinated responsibility in design, engineering, fabrication and erection, Fairmont plants result in "something extra" toward greater operating economy and production efficiency.

When you have a cleaning problem, let Fairmont assume the full responsibility of designing, building or modernizing a plant that guarantees product uniformity and over 99% separating efficiency through a wide size range in any tonnage capacity. CALL A FAIRMONT ENGINEER!

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

How long will your trackwork carry its share of the load?

With mining costs climbing faster than the selling price of coal, it becomes more important than ever to improve production methods and equipment. This in turn throws the spotlight on the need for new and better haulage systems. Track laid with 60-lb rail, or even heavier, to carry larger-capacity cars. Improved layout design to speed movements and cut maintenance to the bone.

The cost can be surprisingly low. Far lower, in fact, than the cost of *not* modernizing. You'll find it especially economical if you turn your haulage problems over to Bethlehem engineers. They have the experience and the facilities behind them to design or revamp your system precisely to your needs, with minimum waste and time loss.

Here is how they would go about it. First, a study of your workings. Next, a plan designed for your individual operation. Then, after approval of details, the cutting, curving and fabrication of the track itself. Your Bethlehem layout would be accurately prefitted at our plant, then shipped to location complete to the last spike and joint bar.

Once installed, such a Bethlehem system would measure up to your requirements for many years to come. With its contribution toward lower mining costs, it would pay for itself surprisingly soon. A Bethlehem engineer is available through the office nearest you. Call him; he will be glad to give you the story in full detail.

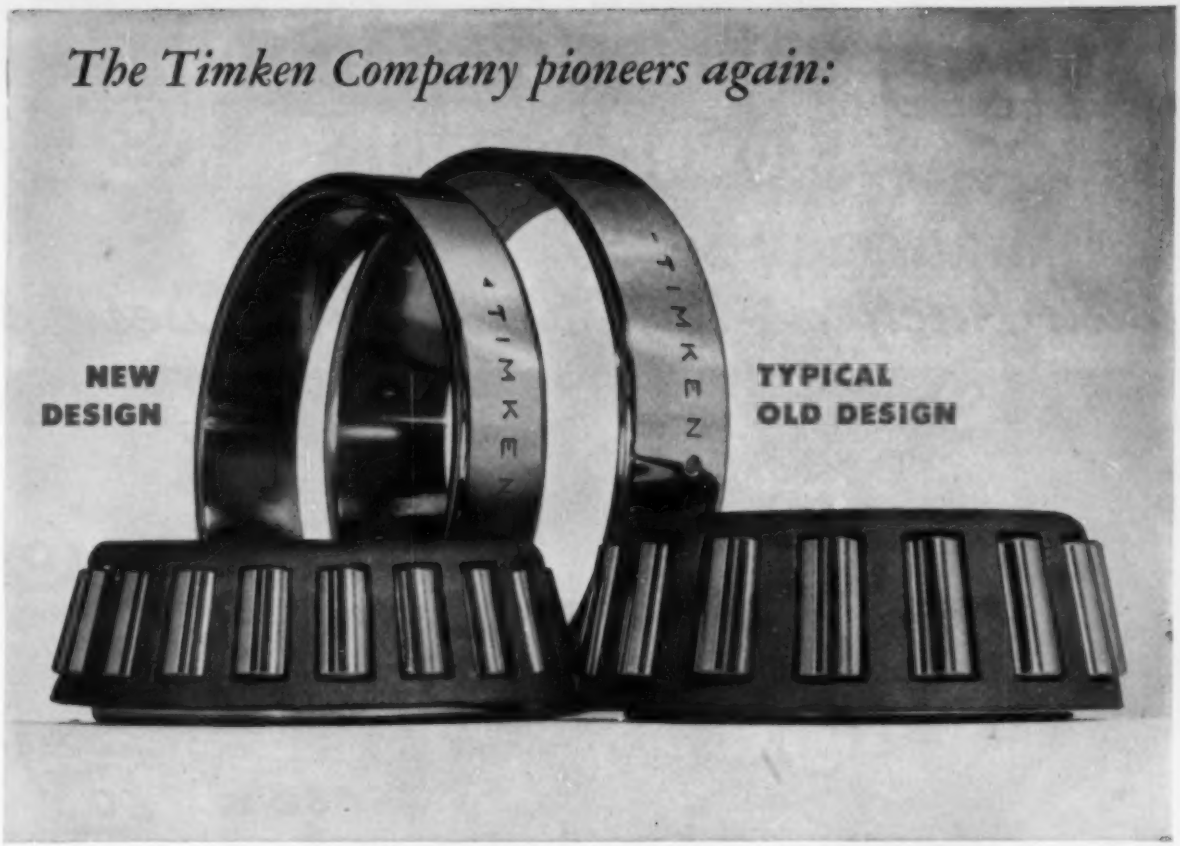
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM PREFABRICATED TRACK

The Timken Company pioneers again:



New TIMKEN® conveyor idler bearings save money, space, weight

THE Timken Company announces two new tapered roller bearings that cost substantially less than the Timken® bearings now used in heavy-duty conveyor idlers. They are considerably smaller in width and outside diameter, weigh 25% less. Yet they have ample load-carrying capacity.

This is the latest achievement of Timken Company research and engineering, which have pioneered many important advances in steel, surface finish and design of tapered roller bearings.

With the new Timken bearings you'll get all the proven advantages of Timken conveyor idler bearings, but at lower cost than ever.

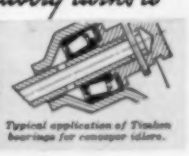
Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction. There's less sliding between idlers and belt.

Full line contact between rollers and races gives Timken bearings the high load capacity you need in heavy duty conveyor applications. And Timken bearings aren't just lubricated for "life", but lubricated yearly, or as conditions require, to insure *long* life. Fresh lubricant ends any chance of gummy, sticky, jammed bearings.

If you haven't seen the new Timken bearings yet, call your Timken Company representative or write: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

Wherever the going's tough industry turns to

TIMKEN
TAPERED ROLLER BEARINGS



Typical application of Timken bearings for conveyor idlers.

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION

You Get Higher Overall Output, Lower Overall Costs...

with Bucyrus-Erie Individual Design

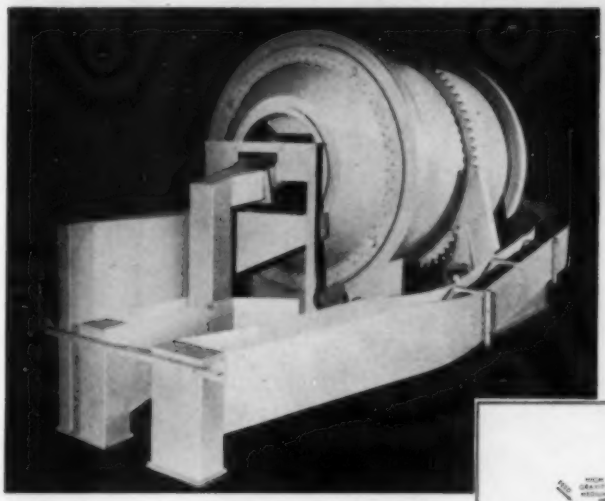
Strength without excessive weight, ample power without wasted horsepower, maximum speed, top efficiency — all that adds up to higher overall output at lower overall costs is yours with Bucyrus-Erie excavators because they're *built right* for their work.

Each model is *individually designed* with just the right combination of power, strength, and weight to do the job of handling its rated load. That means low maintenance, too, because no parts are overstressed and there is no excessive wear.

Individual design is just one of many reasons why Bucyrus-Erie excavators have gained a reputation for top coal loading output. You can get the full Bucyrus-Erie performance story from your nearby Bucyrus-Erie distributor. 42E53

BUCYRUS-ERIE COMPANY South Milwaukee Wisconsin

GET ADDED PROFIT



...from coal middlings

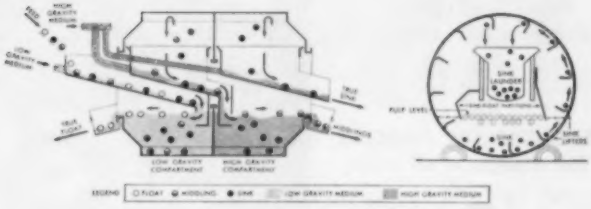
THE WEMCO DOUBLE DRUM

*is the only Heavy-Media Separator producing **three** products by **absolute*** gravity control*

Profitable washing of coal containing middlings to produce low ash coals at greatly increased yields can now be accomplished. Absolute gravity control of separation provided by WEMCO's new Double Drum Separator permits accurate segregation of bone and other middlings from **true float coal** and **true refuse.** This middling material is separated as a third product for recrushing or for sale as a low grade coal.

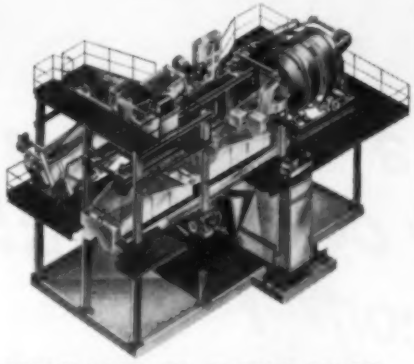
LOW CAPITAL INVESTMENT

The superior results of a two stage process are accomplished in **one** drum and **one** media reclamation circuit. There is no unnecessary duplication. Cost is a minimum.



A POSITIVE OPERATING PRINCIPLE

- True coal float is separated by a low gravity media in 1st compartment, while sink consisting of refuse and middlings passes to 2nd compartment.
- True sink and middlings are separated by a high gravity media in 2nd compartment.
- Both high and low gravity media remain uniform and constant in density in their respective drum compartments.
- Overflow of float material and lifting of sink are simple, effective actions.
- The entire separation is accomplished within one unit.



AVAILABLE IN MOBIL-MILLS

For coal with middling material, WEMCO Double Drum Separators are furnished as the separatory vessels with WEMCO Mobil-Mills — the prefabricated HMS plants used by the majority of Heavy Media operators throughout the world.

For coal requiring less complex treatment, WEMCO MOBIL-MILLS are furnished with single compartment WEMCO Drum Separators or the efficient WEMCO Cone Separator, depending on the nature of the separation involved. *Mobil-Mills are available in various sizes to treat up to 350 t.p.h.*

★ Absolute gravity control provides **positive** separation of the middling by the use of a homogeneous medium. This prevents the lower grades and recoveries common with the partly heterogeneous actions of other types of separating units.

***Write today** for complete information.*

WEMCO
WESTERN MACHINERY COMPANY
760-768 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units Fagergren & Steffensen Flotation Machines • S-H Classifiers • Attrition Machines HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

TAPER-LOCK SOLID STEEL CONVEYOR PULLEY

1. *DRUM DESIGN*
— maximum strength
— minimum weight

2. *FULLY ENCLOSED*
no dust — no dirt — no water

3. *SUBMERGED-ARC PROCESS*
— full strength in all welds

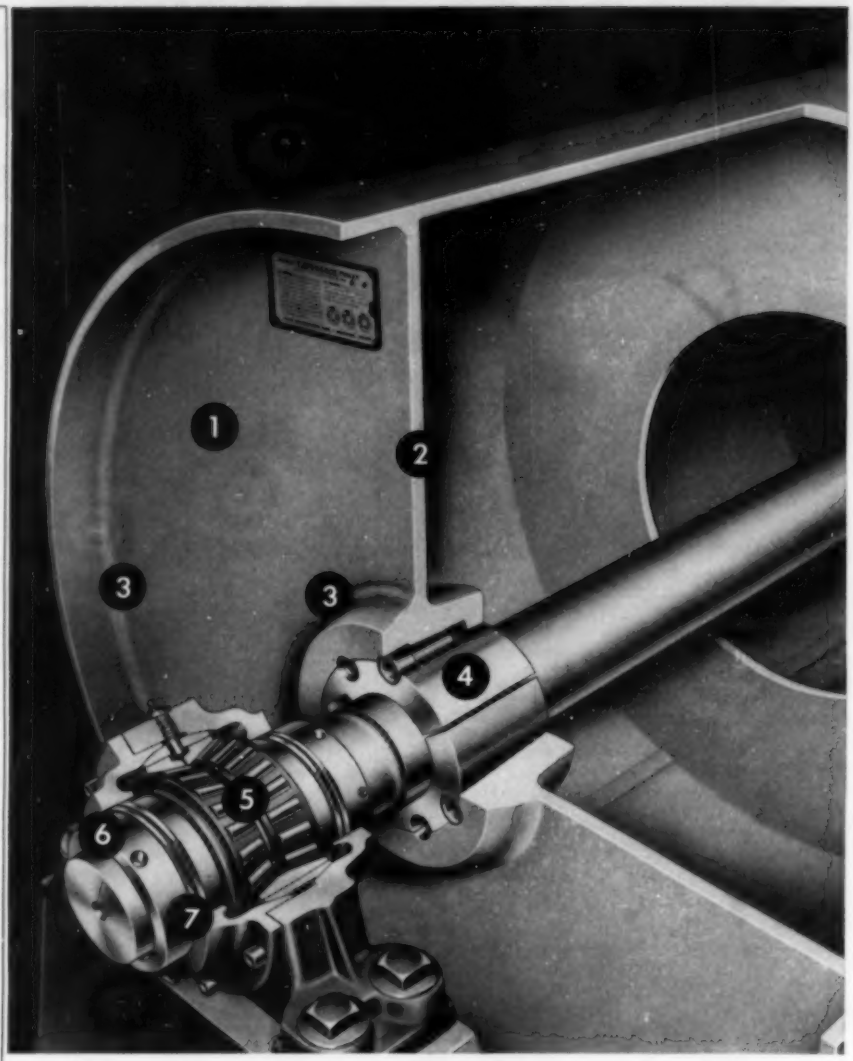
4. *TAPER-LOCK BUSHING*
— no walking on shaft
— easy on — easy off!

DODGE-TIMKEN ALL-STEEL PILLOW BLOCK

5. *NEW HEAVY-DUTY TIMKEN ROLLER BEARINGS*
— fully self-aligning

6. *HEAVY-DUTY ADAPTER MOUNTING*

7. *Sealed both on and off the shaft with DOUBLE PISTON RINGS*



Here's a heavy-duty combination for tough conveyor jobs!

Pulleys from 6 in. to 8 ft. in diameter, all face widths. Bearings from 2 15/16" to 10" bores. Popular sizes stocked by our Distributors. Write for detailed information.

DODGE

of Mishawaka, Ind.

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION, 3000 UNION STREET, MISHAWAKA, INDIANA

"Say, what's wrong with my mine cable?"

"Lots of times we find cable sections like this—necked-down. And that's only one of our troubles. Our cables short out too often. Sometimes jackets creep back from splices. Other times we find broken ground wires. What in thunder are we doing wrong?"

"Well, here's a big part of your trouble:"

"Hourglass sections are a sure sign of too much tension on the cable. So are the other troubles you mention. To end tension . . . keep spring-type shocks at the power source. Keep the reel pulling evenly. Adjust it so there's no back-spooling. Watch out for kinks. And be sure you use a cable that can take it when the going gets tough. Then you'll put an end to your trouble and keep your cables on the job far longer. And remember, one break costs more than the difference in price between a cheap cable and a quality one!"

Be sure with Anaconda's new shuttle car cable

Are cables all alike? No! Quality cables — like ANACONDA's Securityflex* — have proved themselves over the years. Here's why ANACONDA Cables last longer and are safer. The ground wire can stretch more. It will *not* break before the power conductors. *That's a real safety feature.* Jacket is made of a new Neoprene formula. It is stronger. Insulation is long-life, tough cold rubber. It all adds up to real economy *in use.* Get the full facts from your Anaconda Representative. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

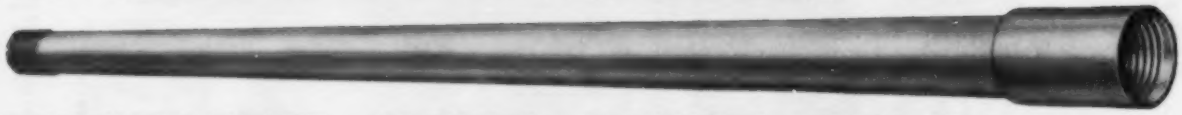
*Trade Mark 54337

the right cable for the job

ANACONDA®

WIRE AND CABLE

FIBERCAST



TUBING AND LINE PIPE

Service in oil fields demonstrates its high ability to resist corrosion

Above—Salt water disposal line of Fibercast pipe. Note how closely it conforms to irregular contour of ground.

Left—Fibercast pipe offers big savings in handling and transportation, as it weighs one-fifth as much as steel and only half as much as aluminum.

For handling mine water laden with sulphur or other corrosive elements, Fibercast has many desirable features.

Fibercast's outstanding ability to resist corrosion gives it long life and excellent reuse value. Its high strength, rigidity and non-shatter quality enable it to withstand rough handling. It is light to handle. It has no elongation and no cold flow, yet follows ground contours. Its values are proven in two years of severe service tests in oil field installations.

Fibercast is centrifugally molded from thermosetting resins reinforced with glass fibers and cured by heat. It is manufactured in 20-foot lengths, of 2⅜", 3½" and 4½" O.D. It is joined with molded threaded couplings of the same material, or "slip" couplings that are permanently joined by chemical bonding. 90° ells, tees and saddles also are available.

For further information, write for our Fibercast Bulletin.

TUBING FIBERCAST LINE PIPE

THE FIBERCAST CORPORATION

P. O. Box 326, Sand Springs, Oklahoma

National Distributors:

THE YOUNGSTOWN STEEL PRODUCTS COMPANY
THE YOUNGSTOWN STEEL PRODUCTS COMPANY OF CALIFORNIA
THE CONTINENTAL SUPPLY COMPANY

A million yards a month . . . stripping COPPER!

P&H Electric Shovels
"THE PRIDE OF THE PIT"

Since July 1952 at Anaconda's new mine in Nevada, four 5-yard P&H Model 1500 Electric Shovels have been stripping overburden and copper ore on a 24-hour schedule, 6 days a week. Average production for each machine is 7,000 tons per 8-hour shift, as the Yerington mines ore production reaches 11,000 tons per day. Much of this digging has been done in ground without resorting to blasting.

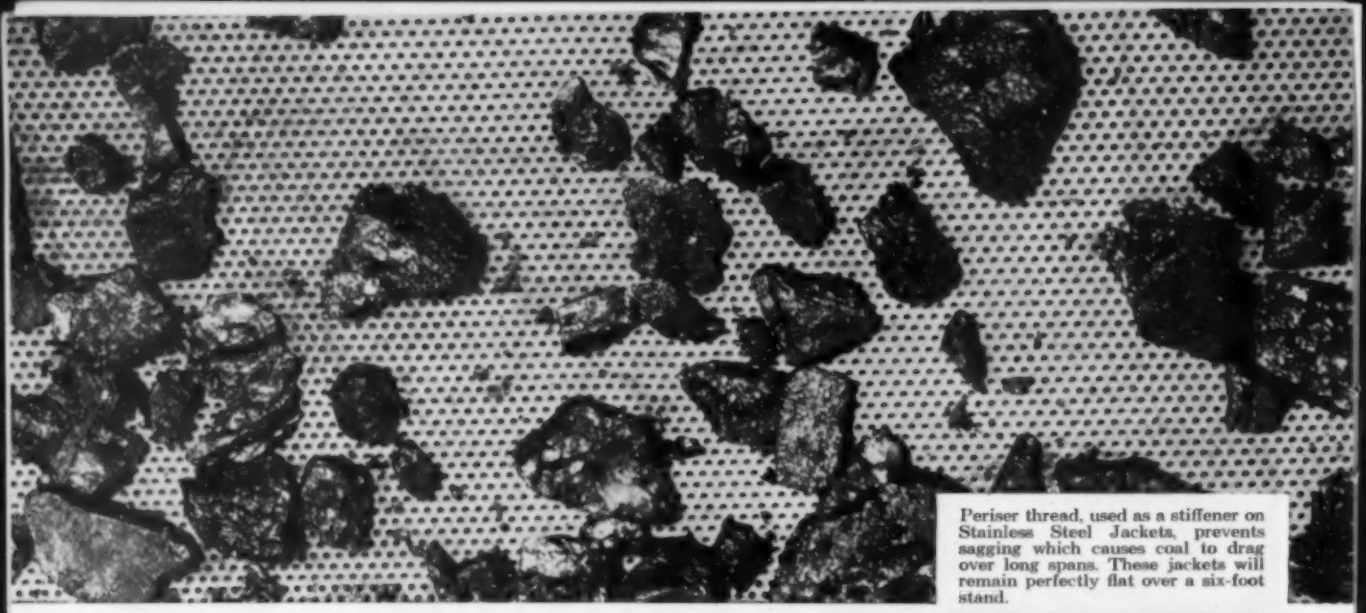
It's the kind of digging where P&H performance shows up such advanced features as all-welded construction, Magnetorque* hoist, independent propel, powerful worm crowd, stepless control. Remember, too, that P&H electrical equipment is designed and built for shovel service.

Steady, dependable production at low tonnage cost — that's the reason why every third P&H Electric Shovel sold is a repeat order. Get the facts. Ask us to send Bulletin X-139.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the P&H Line
TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES



Periser thread, used as a stiffener on Stainless Steel Jackets, prevents sagging which causes coal to drag over long spans. These jackets will remain perfectly flat over a six-foot stand.

25 years of "more coal and better coal with less manpower"

—that's how Stainless Steel pays off for The Hudson Coal Company

THIS CHUTE lined with Stainless Steel, carries wet coal from the shaker discharge into the cone cleaner. The liners are replaced only every four or five years.

▼ Back in 1929, The Hudson Coal Company, Scranton, Pa.—producers of Pennsylvania Anthracite since 1823—conducted side by side tests of every type of metal screens on the same shaker. The results of that test caused Hudson to shift to the use of Stainless Steel in every possible application in its five big anthracite breakers.

Hudson's preparation department sums it up this way: "We have been using Stainless Steel continually since that time with the result that we are producing more Anthracite, better Anthracite, and we are doing it with less manpower!"

Under actual operating conditions in Hudson's breakers, Stainless Steel has outlasted carbon steel 9-1 and bronze by more than 5-1. In addition, it holds a "stand" of six feet without sagging and causing the coal to drag. Stainless Steel also has superior resistance to erosion by the 17,000 gallons of water that pass over it every day.

The 154 Stainless Steel screens operated by Hudson have another advantage. No rust accumulates on them during shutdowns, requiring maintenance and causing metal loss when the rust is removed.

"In the case of chutes," Superintendent J. F. McLaughlin says, "there is no comparison between Stainless and ordinary steel. In two months of service using ordinary steel, the entire body of the chute would have to be replaced. But with Stainless Steel we never have to replace the body and the liners give us up to five years of efficient service."

Stainless Steel can do the same for you in your breaker or preparation plant. Especially if it is perfected, service-tested U·S·S Stainless Steel.

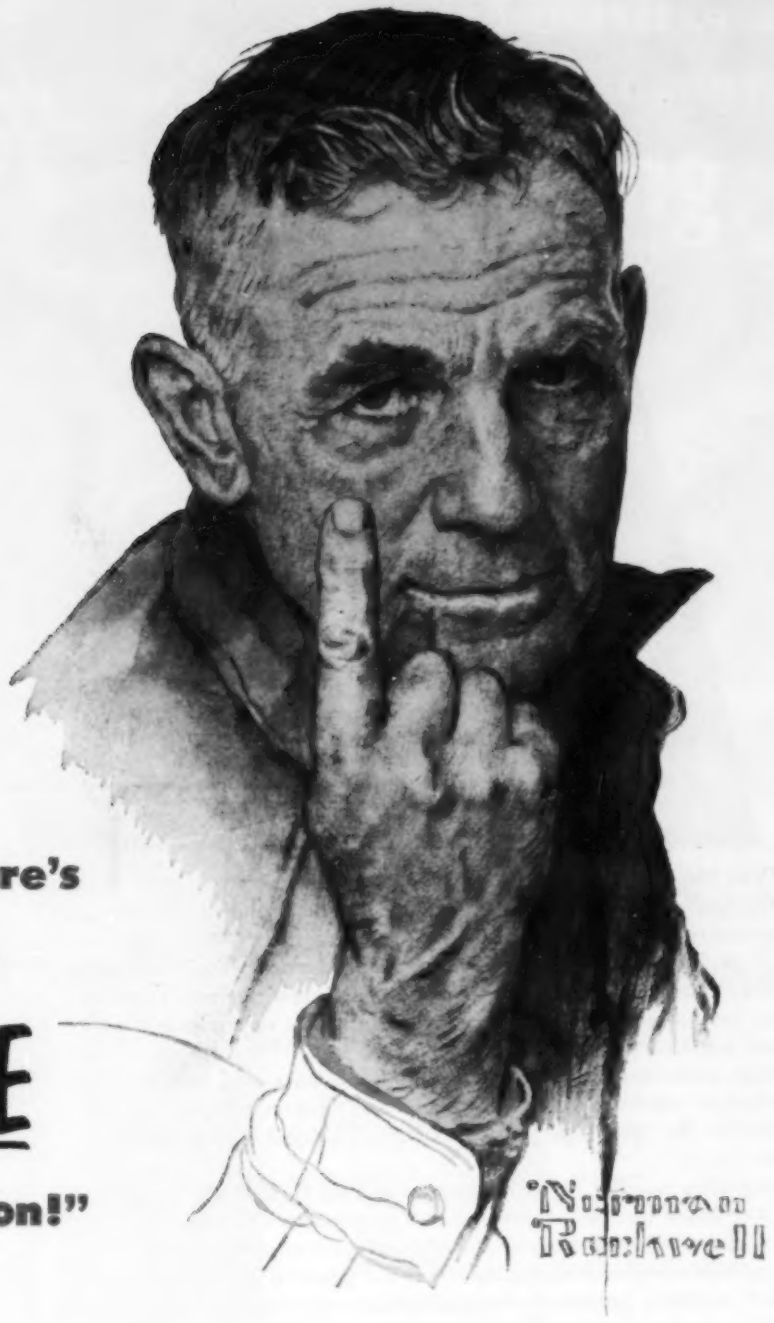
UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

4-71

UNITED STATES STEEL



IT'S JUST THAT SIMPLE. There's only one reason in the world why so many wire rope users in the mining field prefer Roebling wire rope... *it costs a lot less on the job than any other.*

For maximum wire rope efficiency and economy, call your nearest Roebling office for a Field Man. He'll recommend the best ropes for your requirements.

JAR ROEBLING **ROEBLING** CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

HEYL & PATTERSON RESEARCH
GOES BEYOND THE LABORATORY... to serve you

Heyl & Patterson Research Engineers R. M. Sheaffer and F. M. Rafferty gather samples for analysis from the underflow of Heyl & Patterson 3" Cyclones at a large coal preparation plant which is operating on a closed circuit. Field testing of installed equipment is an integral part of the Heyl & Patterson service.

The Heyl & Patterson Research Department exists primarily for one purpose . . . to work with you to find the best solutions to your coal preparation problems.

Experienced H & P Research Engineers spend much of their time in the field . . . moving from plant to plant either to investigate new problems or to keep a finger on the operating performance of equipment previously installed.

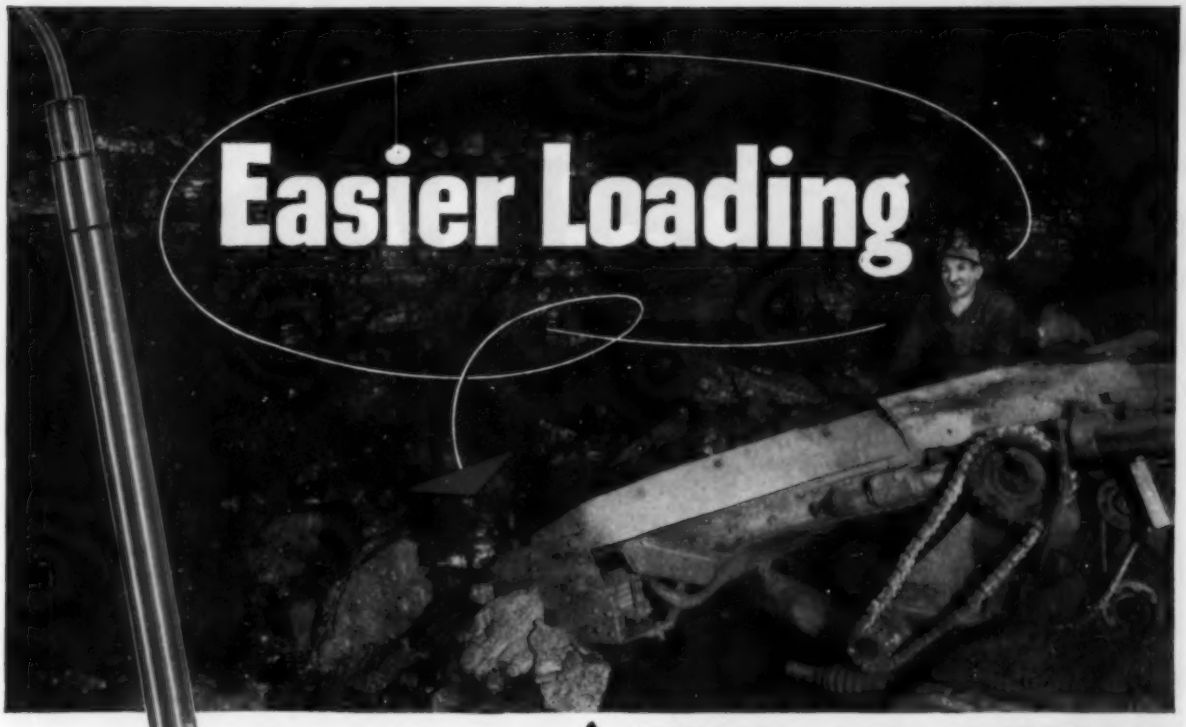
Today numerous preparation plants operate on closed circulating water circuits as a result of installing equipment recommended by H & P engineers. Several other large plants are currently being studied to obtain the same results.

An increasing number of coal operators call on H & P engineers because they know that recommending coal preparation equipment is not guesswork with Heyl & Patterson. It is the end result of precise investigations and expert engineering, backed by years of practical experience.

The H & P method is proved, the findings are accurate and the cost is nominal. When you have coal preparation problems . . . call on H & P Research Engineers to determine the accurate answers.

Cyclone Thickeners
Thermal Dryers
The Drying Dutchman
Reineveld Centrifugal Dryer
Thorsten Coal Sampling Systems
Rotary Mine Car Dumpers
Coal Crushers
Coal Preparation Plants
Bradford Breakers

Heyl+Patterson, Inc.
"SINCE 1887"
55 FORT PITT BLVD. PITTSBURGH 22, PA.



reason why AIRDOX

NON-EXPLOSIVE MINING METHOD

is the cheapest means known for face preparation

This bank of AIRDOX Compressors provides high-pressure air for dislodging coal in a large mine. Air is distributed through the mine by easily installed tubing.

The picture above tells its own story!

It shows how the "gentler", heaving action of AIRDOX dislodges coal in firm, large lumps, ready for easier, lower-cost mechanical loading. Notice also the excellent condition of the roof structure and face.

Important as it is, this is just part of the savings effected with AIRDOX. In mine after mine, it has also been proven that . . .

- **The actual cost of dislodging coal is less with AIRDOX in practically every case.**
- **AND, because AIRDOX produces less fines, it reduces cleaning costs.**

Our engineers are ready to show you, with facts and figures, the economies you can expect with AIRDOX in *your* mine.
WRITE AND WE'LL ARRANGE A FREE SURVEY.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

WAREHOUSES

Harper, West Virginia
Phone: Beckley 4812

Benton, Illinois
Phone: Benton 8-3821

St. Clairesville, Ohio
Phone: St. Clairesville 619

Library, Pennsylvania
Box 427
Phone: Library Colonial 3-6910

Camden-on-Gauley, W. Va.
Phone: Camden-on-Gauley 2181

Evansville, Indiana
307 Northwest Fifth St.
Phone: Evansville 2-8944

Pikeville, Kentucky
Route 2, Box 99
Phone: Robinson Creek 5

Louisville, Colorado
Phone: Louisville 234

Ottumwa, Iowa
Phone: Ottumwa 1900

when Overburden squeezes the profits out of stripping . . .

drill!

CARDOX Surface AugerMiner

CARDOX Surface AugerMiner teams up with mechanized loading for fast, lower-cost coal production.

Restores Abandoned Workings to Profitable Production

When excessive overburden puts a stop to conventional stripping, CARDOX Surface AugerMiners put mines back into profitable production. Drilling 100 to 120 feet, they salvage volume tonnage at a cost usually far less than for the original working. This "bonus" tonnage is *easy to get.*

CARDOX Surface AugerMiners are simply trucked or towed on their detachable wheels to the exposed surface. They are self positioning to the height of the seam. A rugged, 145 H.P. engine drives augers that drill holes up to 38 inches in diameter. AugerMiner coal is *clean* and *free of rock or shale* — because directional control keeps the auger boring into the best part of the seam. Coal can be loaded mechanically into trucks without further processing. A built-in retriever makes it easy to add or remove the 6-foot auger sections.

If you have a seam where overburden has squeezed the profits out of conventional stripping, you may have abandoned your best paying tonnage! Investigate the CARDOX Surface AugerMiner. See your CARDOX Representative — or write for AugerMiner Bulletin.

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307 Northwest Fifth St.
Phone: Evansville 2-8944

Pikeville, Kentucky
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Phone: Robinson Creek 5

Louisville, Colorado
Phone: Louisville 234

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Phone: Ottumwa 1900

TO LICK the really rough ones *on schedule*, mount U. S. Royal Nylon Con-Trak-Tors on your equipment.

ALL-NYLON STRENGTH

The Con-Trak-Tor's Nylon cord carcass *won't quit* under vicious shocks and jolts. You're sure to get all the long service life built into this great tire.

TRIPLE IMPACT PROTECTION

1. *Extra rubber* between cord plies. 2. *Double shock-pads* beneath the tread. 3. *Built extra-tough at the crown* to withstand snags and rocks.

FULL LUG TRACTION

The Con-Trak-Tor's *full-width* lug design pulls you through where others bog down, won't strand you in heavy going, gives *extra* protection from side-slip.

Talk the Con-Trak-Tor over with your U. S. Royal Dealer. He can equip you with the size you need for the job you want to get done!

Tough Jobs Get Done ...on NYLON!

U.S. ROYAL

CON-TRAK-TOR

FULL LUG

US RUBBER UNITED STATES RUBBER COMPANY

FOR THAT EXTRA MARGIN IN SHOVEL PERFORMANCE...

WARD LEONARD ELECTRIC EXCAVATORS

MORE OUTPUT even under the toughest conditions . . . more loads per shift in any quarry or mine . . . extra loads for that EXTRA MARGIN in performance . . . that's what you get from this exclusive combination of shovel front-end features:

1. **TWO-SECTION BOOM** provides maximum strength with minimum weight. The lower section is rigidly connected to the A-frame . . . takes the heavy stresses of the digging cycle in stride because it is part of the main machine.

2. **TUBULAR DIPPER HANDLE** is much lighter than equivalent two-member handle, yet equally strong. Its ability to rotate in the rubber-cushioned saddle block eliminates torsion during the digging stroke, minimizes shock loads.

3. **TWIN DUAL HOIST ROPES** assure a steady, positive digging action with automatic shift of hoist power to that part of the dipper lip where it is needed.

4. **INDEPENDENT ROPE CROWD** is simple, positive and quiet. Shipper shaft pinions and handle racking are eliminated. Crowd machinery is located on main deck rather than on boom — swing inertia is reduced, the operating cycle speeded up.

5. **QUICK CONVERTIBILITY** to dragline of the independent motor type. Hoist and drag functions are powered by separate motors, eliminating operating clutches and brakes. 5154

These features — plus many more — make Bucyrus-Eries the finest heavy-duty excavators ever built: yard for yard, dollar for dollar, pound for pound. Write today for complete information on the 4½-yd. 110-B, the 6-yd. 150-B, or the 8-yd. 190-B.

Bucyrus-Erie Company

SOUTH MILWAUKEE
WISCONSIN

Choose from this complete line of ratchet jacks for servicing all your equipment!

No. 516-MT
5-TON CAPACITY

No. 1017
10-TON CAPACITY

No. 1022
10-TON CAPACITY

No. 2028
20-TON CAPACITY

▲ *Every Duff-Norton Ratchet Jack is guaranteed at full capacity for loads applied to either head or foot lift.*

Regardless of the type or kind of mining machinery or equipment that requires lifting, lowering or pushing, there's a safe, dependable, precision-made Duff-Norton Ratchet Jack that will do the job faster, easier, with less physical effort. The jacks shown here are only a few of the many Duff-Norton Ratchet Jacks designed and made expressly for rough, tough, day in and day out service in and around coal mines. All have the exclusive patented Duff-Norton *easily replaceable*, adjustable spring mechanism for long, positive, trouble-free service.

To get the complete story on how these and other Duff-Norton Jacks can save you time and money, see your local distributor or write to the world's oldest and largest manufacturer of lifting jacks for your free copy of "A Handy Guide for Selecting Duff-Norton Mine Jacks"—ask for catalog AD 10-J, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON *Jacks*

"Giving Industry a Lift Since 1883"

Move more payload at lower cost with BIG equipment built to last with

USS High Strength

● Mine operators all over the country are finding that big capacity equipment boosts output—increases tons per man shift—cuts costs. But, to make these big draglines, trucks and dozers pay off as they should, they must have the rugged durability it takes to stay on the job. The USS High Strength Steels, USS COR-TEN, USS MAN-TEN and USS TRI-TEN, can give your equipment built-in stamina to insure more productive time for your investment and less maintenance and repairs.

These famous "steels that do more" have a 50% higher yield point, and offer greater resistance to wear, fatigue, abrasion and impact than ordinary carbon steel. Thus, you can use USS High Strength Steels in the vital parts of your mining equipment to increase their strength and life *without* increasing their weight. When the use of thinner sections is feasible, these tough, strong steels can: (1) reduce equipment weight without reducing its strength; or (2) increase the size and capacity of equipment without increasing total weight or the power needed to move it.

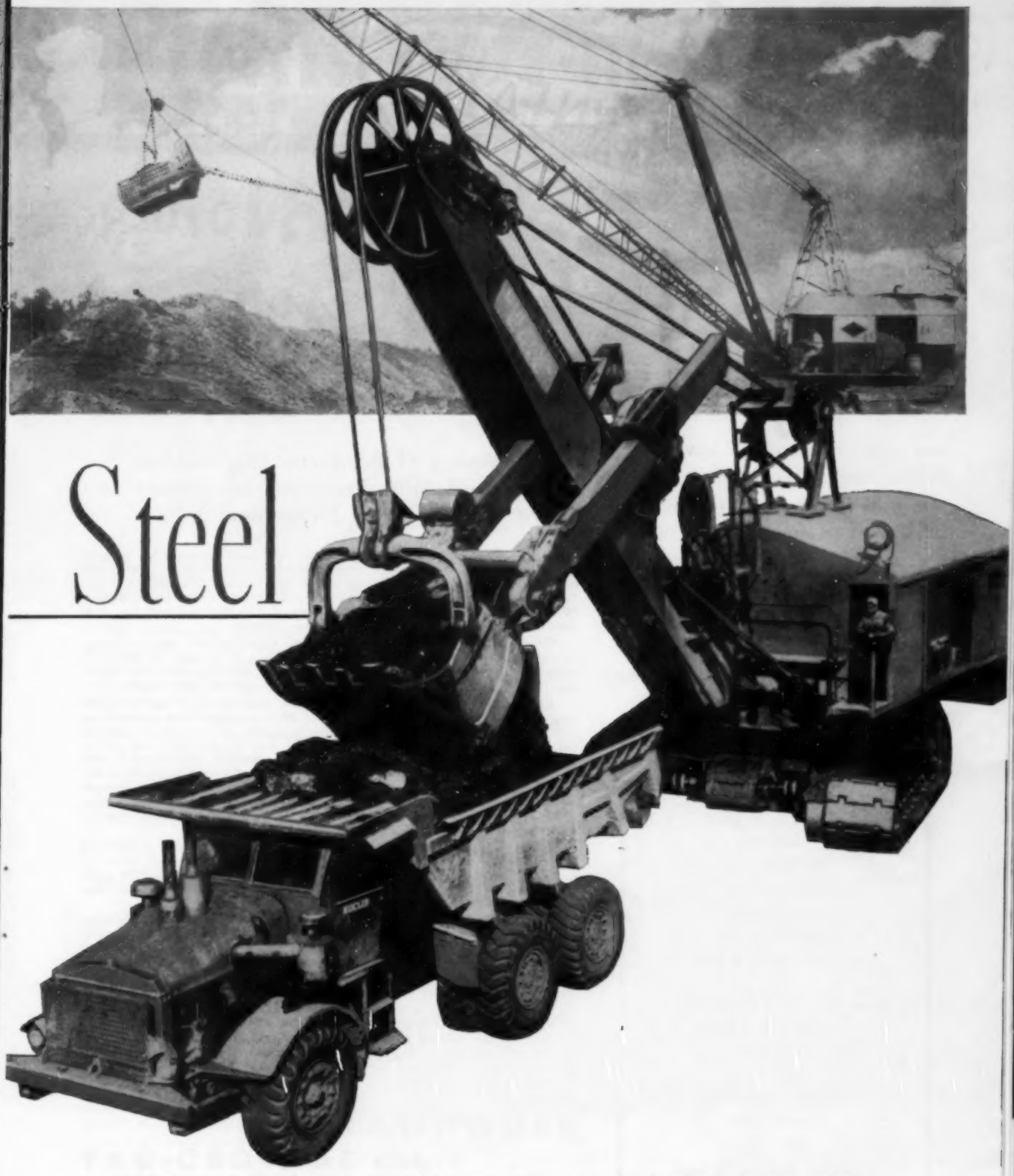
If you are handling highly abrasive materials, if your equipment must operate in sub-zero temperatures or in highly corrosive atmospheres, these USS High Strength Steels, used singly or in combination, will give high resistance to these destructive factors. The result—your equipment stays *in* productive operation and *out* of the repair shop.

For more information or application data concerning USS High Strength Steels call or write our nearest office.

New book gives complete story of

USS COR-TEN steel

Just off the press, this 58-page book is filled with factual data about USS COR-TEN steel. Contains list of physical properties and characteristics, shows savings that can be effected through its use. Send for your free copy today.



Steel

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS High Strength Steels

4-1027

UNITED STATES STEEL

THE BROWN-FAYRO COMPANY
JOHNSTOWN, PA.

Now a Division of Sanford-Day Iron Works

A Combining of Products, Engineering Ability and Manufacturing Equipment to Serve Mining More Economically

Sanford-Day Iron Works and The Brown-Fayro Company are pleased to inform the mining industry that Sanford-Day has acquired the assets of The Brown-Fayro Co., Johnstown, Pennsylvania. The Brown-Fayro Co. will be known as the Brown-Fayro Division of Sanford-Day Iron Works, Inc. Mr. C. O. Crump, president of The Brown-Fayro Co., will continue as manager of our Brown-Fayro Division.

Brown-Fayro has, for almost 40 years, manufactured room, rigging, car spotting and car moving hoists, mine pumps, hoist and car retarders, mine and man cars, wheels and trucks, rerailers and derailers, mine blowers, sheaves and rollers, check and foot valves and oil spray outfits.

Early in 1917, the "Brownie" room hoist was developed for the handling of mine cars in working places. In 1926 a gravity type railroad car retarder was developed. This was the beginning of the line of railroad car handling equipment which now covers several types and sizes of retarders and hoist-retarders. About 1928, the company developed a slow speed heavy duty car spotting hoist, which was the forerunner of a line which now includes several models. A barney type spotter was brought out in 1941 and a hydraulically operated one more recently. Brown-Fayro pioneered the "cold oil" method for dust control and freeze-proofing of coal.

In 1951 we at Sanford-Day celebrated our fiftieth year of building mine cars and wheels for the mining industry. The automatic mine car haulage system was pioneered and developed by Sanford-Day. In addition, we have originated most of the improvements in design and construction of mine cars and wheels.

Sanford-Day designed and built the first successful anti-friction bearing wheel for mine cars . . . the first low bottom car and the first high capacity rotary dump car. Other firsts were the "ball bearing" mine car wheel, the bottom dumping mine car, the latch lever and the "Twin Safety Latches" for bottom dumping cars. Recently, we designed and began building a revolutionary new granby car for metal mines.

We mention these facts with pride because they have been tremendous factors in lowering the production costs of mining over the years.

Serving the mining industry more economically is the prime factor in the merged experience, ability and products of the two firms. The Brown-Fayro policies that have built a wonderful reputation and confidence in their products will be continued.

BROWN-FAYRO DIVISION

The "Brownie" Line
Rigging, Car & Haulage Hoists
Car Retarders
Hydraulic Car Spotters
Mine Pumps
Mine Blowers
Cold Oil Spray System

SANFORD-DAY IRON WORKS

Automatic Dumping Mine Cars
Rotary Mine Cars
Granby Cars
Man Cars
Precision Bearing Wheels

BROWN-FAYRO AND SANFORD-DAY TO SERVE MINING BETTER

Sanford-Day Iron Works, Knoxville, Tenn.

Profits start in the Pit!

Their dependable performance and high job availability, combined with big payload capacity and fast travel speeds, have made "Eucs" the preferred hauling equipment for open pit operations in both the anthracite and bituminous fields. Because they're built for tough off-the-highway service, Rear-Dump and Bottom-Dump Euclids make more profits for owners by cutting the cost of hauling coal, overburden and mine waste.

Your Euclid distributor can show you the way to lower hauling costs... have him provide a hauling production and cost estimate for your operation... there's no obligation, of course, so get in touch with him soon.

In the anthracite fields of Pennsylvania Rear-Dump "Eucs" outnumber all other makes of off-the-highway units combined... more than 800 of them are working in these open pit mines. Because of their unequalled record of high production and low hauling cost, it was only logical "Eucs" were selected by Wadesville Production Co. Twenty of them, ranging in size from 22 to 34 ton capacity, are at work on this huge stripping operation.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Maumee Collieries Co. of Indiana uses four 40-ton Euclid Coal Haulers to haul from the pit to the plant at Mine No. 28 near Jasonville. Loaded haul of 5000 feet takes just over 4 minutes and a complete cycle, including loading which requires 4.4 minutes, is made in 16 minutes or less. "Eucs" are also working at two other mines of this big producer... Maumee has been a Euclid user since 1946.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Rollways ROLL right because they're MADE right

RIGHT ANGLE DESIGN
increases bearing efficiency

RIGHT-ANGLE ROLLER ENDS . . . precisely square to avoid end rub, oscillation and side-shock.

RIGHT-ANGLE BEARING SURFACE . . . precisely parallel to promote unwavering rightline rolling.

RIGHT-ANGLE SEPARATOR SLOTS . . . precisely machined to prevent roller skew, slide and uneven wear.

Line for line and surface for surface, each maximum-load type Rollway Bearing is a striking example of right-angle trueness. The straight, solid cylindrical rollers provide maximum contact area in any given dimension. You get full load-carrying capacity and greater ability to absorb shocks, vibration and overload.

The net result is smoother running, longer life, reduced service cost, and less down-time due to bearings.

ROLLWAY BEARING CO., INC.
SYRACUSE 4, N. Y.

• Our engineers will gladly work with you on your bearing problems. Confidential consultation. No charge — no obligation.

Rollway Bearing replacements are available through authorized distributors in principal cities. Consult your classified phone directory.

ROLLWAY
BEARINGS

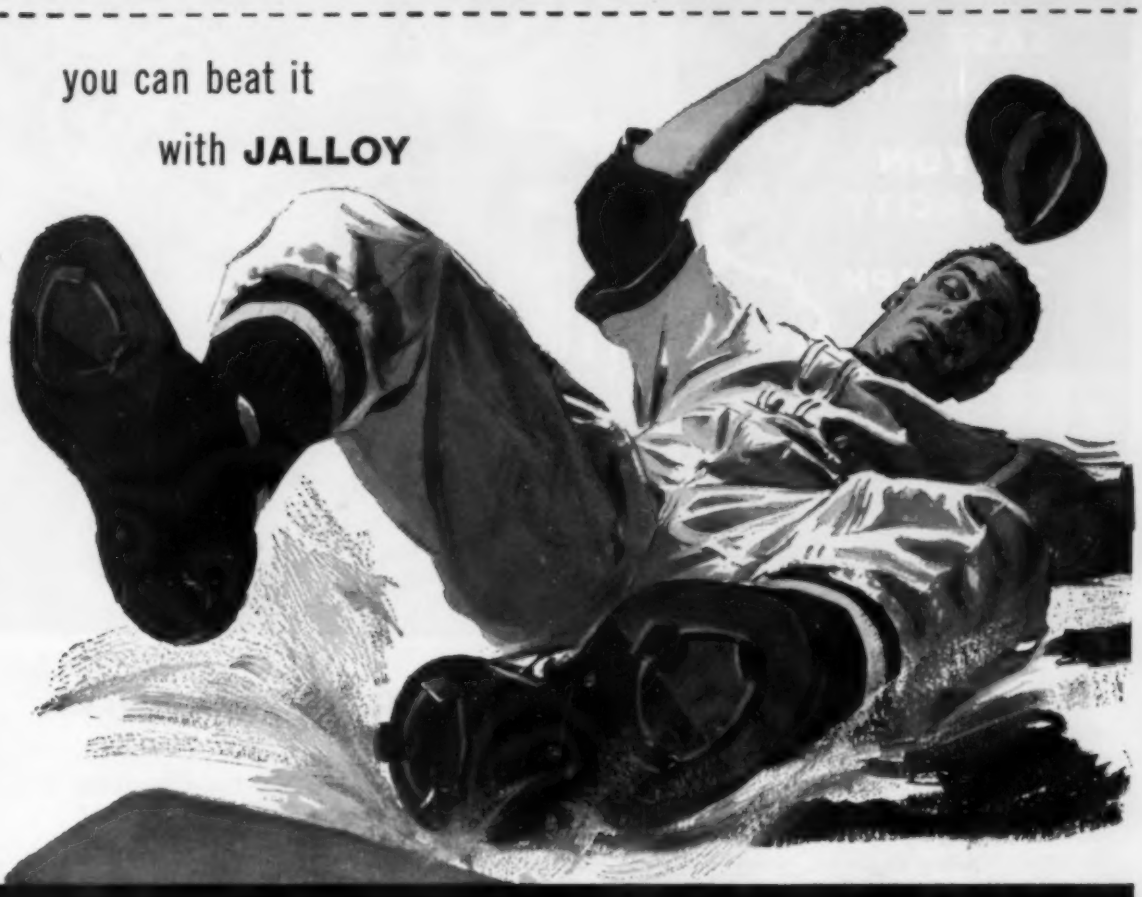
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Boston • Detroit • Milwaukee • Syracuse • Chicago • Houston • Philadelphia • Toronto • Cleveland • Los Angeles • Pittsburgh • San Francisco • Seattle

FACING A TOUGH PROPOSITION?

you can beat it

with **JALLOY**



J&L JALLOY HEAT-TREATED PLATE BEATS WEAR DUE TO ABRASION

J&L Jalloy Heat-Treated Plate is the general purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades to meet various service requirements.

J&L STEEL

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 411, Pittsburgh 30, Pa.

☐ Please mail complete data concerning Jalloy.
☐ Please have your representative call.

Name_____ Title_____

Company_____

Address_____

THAT'S THE NEW ATHEY PH20 COAL HAULER

Few haulers can offer big capacity, high speeds *and* easy handling—the new Athey PH20 Coal Hauler can, because it was designed specifically for high-speed hauling of big loads of coal.

Athey engineers, working closely with Caterpillar engineers, studied the problems encountered in coal hauling equipment. They matched power to capacity, speed to weight, and performance to needs. The machine produced was tested and retested on actual mining operations until the PH20 was perfected.

The result is a machine that can quickly maneuver, take a heaped 40-ton load from a shovel, get into high gear in a few yards of travel, haul safely at speeds to 34.2 MPH, dump accurately and completely into hoppers, grizzlies or windrows.

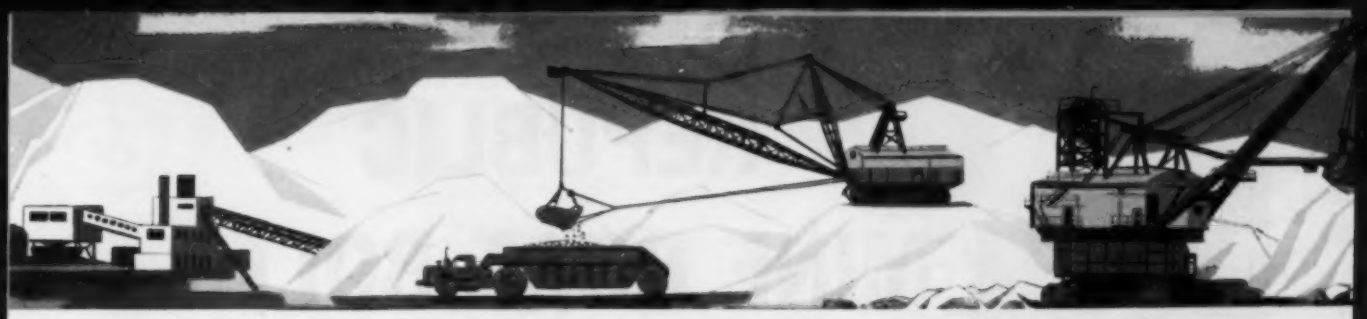
Your Athey-Caterpillar Dealer can arrange a trip to see the PH20 at work. Just phone him or write direct.

ONLY THE PH20 CAN OFFER ALL THESE COST-CUTTING FEATURES . . .

- Wide (10'), open-top hopper makes an easy target for shovels, draglines or other loaders!
- Low loading height (10' 4" average) permits use of any type of loader!
- Powered by 225 HP Cat Diesel Engine—exceptional lugging ability for up-hill hauls!
- Burns low-cost No. 2 burner oil—cleanly, completely!
- Big tires all around—24:00 x 29 on tractor drive wheels and trailer wheels—for traction and flotation.
- Ten speeds to match any need—your choice of from 2.9 to 34.2 MPH or 2.2 to 25.6 MPH!
- Four-wheel air brakes—with ample area for positive stops!
- Frameless, all-welded trailer design absorbs torque and twists of rough, fast hauls!
- Bottom-dump—air release for fast, full dumps . . . controlled dumps with hydraulic action!
- Backed by the world-wide Caterpillar-Athey Dealer organization—immediate service for parts or repairs!

Athey
PRODUCTS CORPORATION

5631 West 65th Street • Chicago 38, Illinois



Now! cut application costs and grease inventories with

NEW STANOLITH GREASE MP

You need only this *one* grease for many kinds of heavy equipment!

Added high-load carrying capacity!

Resists both water and high temperatures!

Here is a newly formulated grease with such an increase in multi-purpose range that it helps you *cut application costs* and *reduce grease inventories*. Higher oil viscosity and greater extreme pressure properties make it suited for wide use in steel mills, cement mills, rubber mills, mining operations—all other heavy equipment industries.

More than just an "E. P." grease, New STANOLITH MP has all of the outstanding properties of STANOLITH greases: excellent oxidation stability and good mechanical stability. It has extreme water resistance and withstands high temperatures—*it will not thin out*. For better protection of all kinds of heavy equipment, under a wide range of conditions, use STANOLITH Grease MP.

NOW STANOLITH Grease MP takes its place with famous STANOLITH Greases No. 42 and No. 57 to give you the most versatile collection of multi-purpose greases in modern industry.

STANDARD OIL COMPANY *(Indiana)*

Call your nearby Standard Oil lubrication specialist and let him show you how Standard's "multi-purpose" greases can save you money and help you avoid trouble.

STANDARD

REPUBLIC MINE ROOF BOLTS

For Safer Mining Operation

Republic makes two types of mine roof supports, the square head bolt and the slotted roof rod. Either type can be used for vertical or angle bolting—depending on roof strata.

REPUBLIC SQUARE HEAD BOLTS—Available in two diameter sizes—⅝-inch and ¾-inch. The ⅝-inch size is a new development by Republic and is a high-tensile bolt. Both sizes have rolled threads with square head and forged washer. They can be used in combination with roof channels, roof ties, roof plates or angle washers.

REPUBLIC SLOTTED ROOF ROD—A one-inch rolled thread rod with slotted end to take wedge. Furnished with hex or square nuts and various size roof plates.

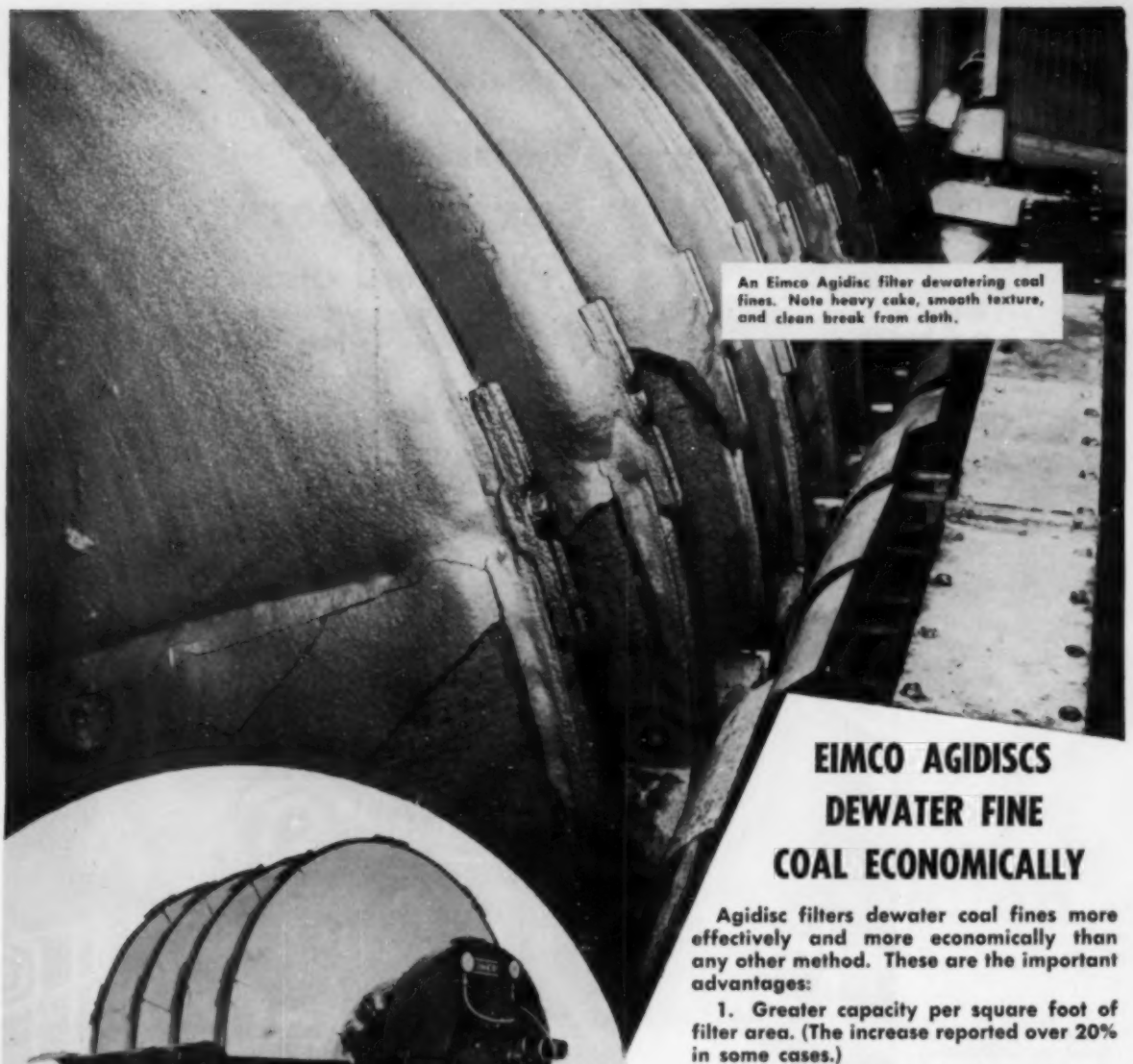
Shank lengths are available in sizes from 18 inches to 96 inches—special lengths on request. For more information on Republic Mine Roof Bolts, write to:

REPUBLIC STEEL CORPORATION
Bolt and Nut Division • Cleveland 13, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

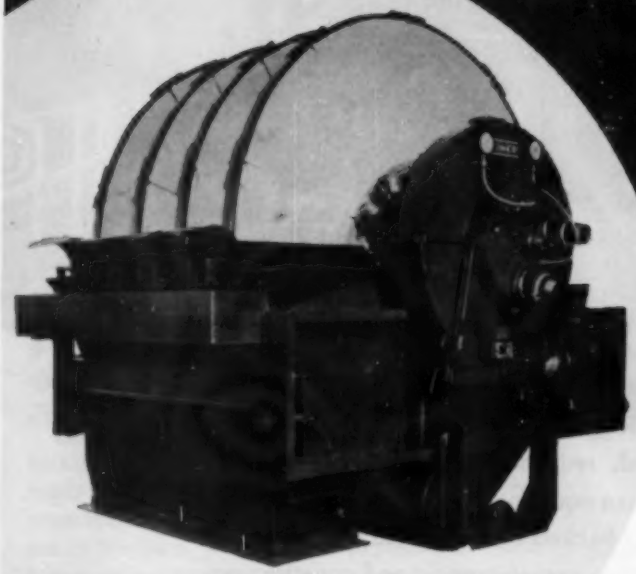
REPUBLIC BOLTS AND NUTS

REPUBLIC STEEL

Other Republic Products include Steel and Plastic Pipe, Tubing, Lockers, Shelving — Carbon, Alloy and Enduro Stainless Steels — Titanium



An Eimco Agidisc filter dewatering coal fines. Note heavy cake, smooth texture, and clean break from cloth.



An Eimco 8' diam. x 4 disc Agidisc type filter — one of many popular sizes in coal washing plants.

EIMCO AGIDISCS DEWATER FINE COAL ECONOMICALLY

Agidisc filters dewater coal fines more effectively and more economically than any other method. These are the important advantages:

1. Greater capacity per square foot of filter area. (The increase reported over 20% in some cases.)

2. Even distribution of cake over entire surface of disc sector for uniform drying of cake.

3. Lower moisture content in cake which results in many cases in the elimination of auxiliary equipment to drive off moisture from the coal fines.

4. Greater life in fliter media; resulting in an additional savings — and many other advantages.

Investigate Eimco filters for dewatering coal fines. Our Research Development Department is prepared to offer you competent trained engineering assistance on dewatering problems. Let us tell you more about this important Eimco service.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

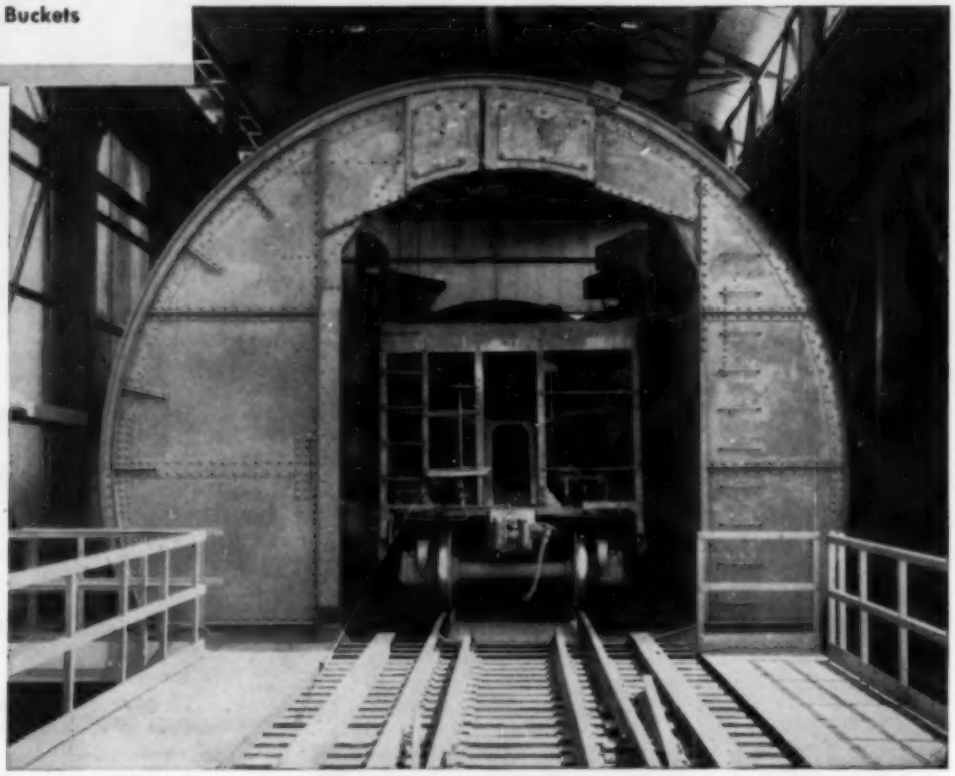
New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

Wellman will build it

Special Cranes
Car Dumpers
Gas Producer Plants
Ore Bridges
Charging Machines
Forging Manipulators
Gas Flue Systems
Gas Reversing Valves
Coke Pushers
Mine Hoists
Skip Hoists
Clamshell Buckets

→ Wellman car dumpers

...designed and built for years of dependable service



Wellman 60-ft., 4-clamp Revolving Car Dumper. A rack segment and pinion at each end of the frame turns each end equally, preventing distortion of the frame.

● The complete line of Wellman Car Dumpers includes Lifting, Turnover, Traveling and Revolving Types, the latter is shown above. It is self-contained, requiring no external structures. You can depend on Wellman equipment for many years of economical performance. It is backed by more than half a century of experience in engineering, manufacturing and construction.

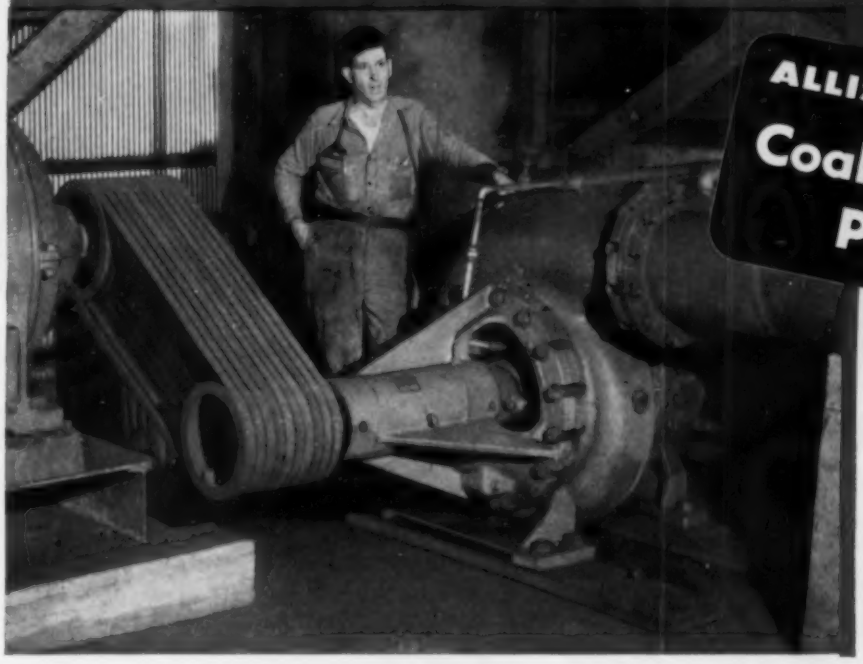
THE WELLMAN ENGINEERING COMPANY

7012 CENTRAL AVENUE • CLEVELAND 4, OHIO

Operators Report . . .

"INCREASED PUMPING LIFE 3 TIMES"

"SAVES US $300 PER MONTH IN MAINTENANCE"



ALLIS-CHALMERS
Coal Washing
PUMP

Long Life...Low Cost Operation

Proved by Service Records

In many operations, where other pumps had a life of two or three weeks before they required service, Allis-Chalmers coal washing pumps piled up an impressive record. Typical service records show: 8 months, no loss of capacity — 9 months, 2 and 3 shifts, new impeller — 10 months' service, no parts replaced. These are just a few examples.

Allis-Chalmers coal washing pumps have established this fine record because they are made of a special hard alloy . . . because extra wear is built into impeller and wear plate by the use of *Ni-Hard** . . . because they are built with extra strong parts and extra thickness of metal in critical parts . . . because they are application engineered by men who know coal washing equipment problems.

When replacement finally does become necessary, A-C coal washing pump is easy to tear down and reassemble. Wearing parts are separated into easy-to-handle units. Piping need not be disturbed.

A-4322

* 3 largest sizes special hard alloy throughout.
6 sizes all *Ni-Hard* available.

ONLY 5 WEARING PARTS

Shaft sleeve
Impeller
Casing
Two wear plates

ALL EASY TO HANDLE AND EASY TO REPLACE.

For complete information about Allis-Chalmers coal washing pumps, call your local A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletin 08B6381.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

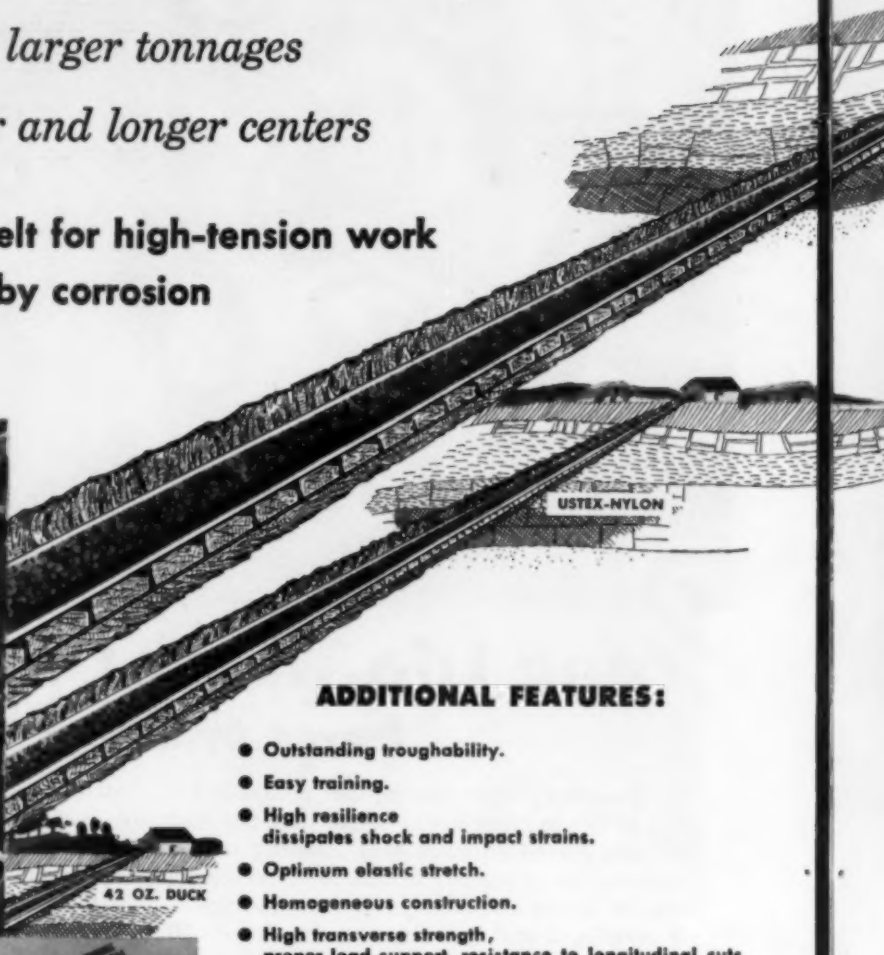
BREAKING THROUGH TO NEW HIGHS WITH THE NEW U. S. SUPER USTEX-

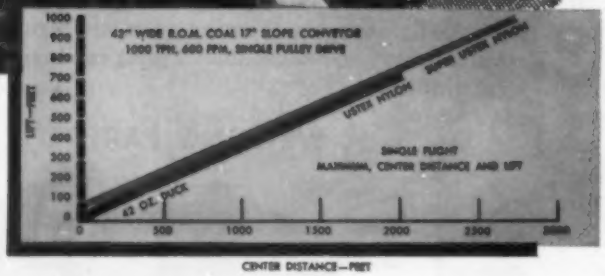
for higher and higher lifts

larger and larger tonnages

longer and longer centers

The high-strength belt for high-tension work
— — not affected by corrosion





ADDITIONAL FEATURES:

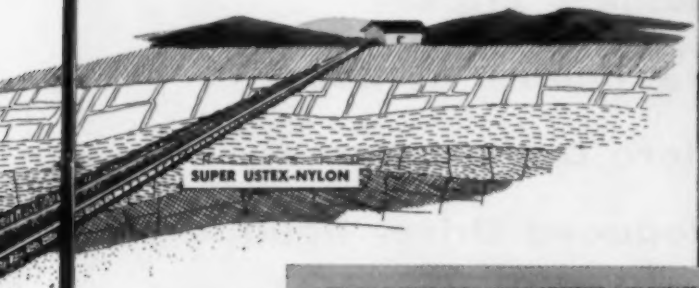
- Outstanding troughability.
- Easy training.
- High resilience dissipates shock and impact strains.
- Optimum elastic stretch.
- Homogeneous construction.
- High transverse strength, proper load support, resistance to longitudinal cuts and tears, resistance to flexing fatigue.
- Low permanent stretch.
- High safety factor.
- Easy to splice— no special skills, techniques or materials required.
- Belt tension distributed evenly through entire carcass.
- A patented construction exclusive with United States Rubber Company.
- Mildew-inhibited.

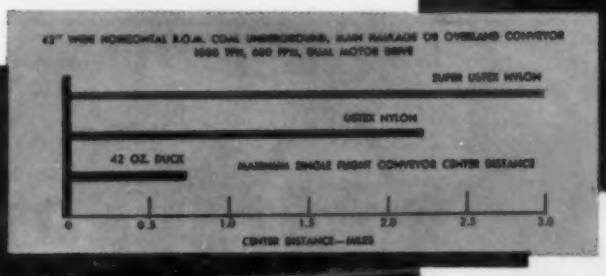
US RUBBER

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION

NYLON BELT!





This great new Super Ustex-Nylon Belt is the latest in United States Rubber Company's parade of Belt Champions.

In 1929, "U. S." gave coal haulage a history-making lift—by presenting the 42-oz. duck belt, later to become standard in the industry.

In 1939, "U. S." came out with the strongest belt ever made up to that time—the famous 48-oz. duck belt. So strong was this belt that the first one installed is still in active service.

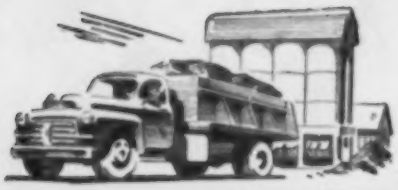
In 1948, still anticipating that in the years ahead mine operators would find it necessary to haul ever-increasing tonnage up higher and higher lifts, "U. S." introduced the Ustex-Nylon Belt—to handle the great tensions that were undreamed-of years before. In one mine alone, this belt cut haulage cost 50 cents per ton with 25% lower investment, and saved 6,000 feet of coal travel.

And now, in 1954, comes the latest champion, the Super Ustex-Nylon Belt, far stronger than even its illustrious predecessor. This great belt will carry record-breaking tonnages saving the coal industry additional thousands of dollars.

There is always a "U. S." sales engineer ready to work out haulage problems for you through Three-Way Engineering—the "U. S." method of working with mine engineers and the designers of conveyor equipment. Consult any of the 26 "U. S." District Sales Offices, or write to address below.

"U. S." Research perfects it ... "U. S." Production builds it ... U. S. Industry depends on it ...

ROCKEFELLER CENTER, NEW YORK 20, N. Y.



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Power When Needed

Quicker Trips

Maximum Pay-Load

More Dollars Earned

Reduced Driver Fatigue

Lower Operating Cost

Reduced Engine Wear

Minimum Shop Time

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Longer Truck Life

Higher Trade-In Value

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More than Two Million Eaton Axles in Trucks Today!

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AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

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IMPOSSIBLE WITHOUT EXPLOSIVES

Modern explosives, conceived through continuous research, have become an important key to efficiency and economy in mining, quarrying, construction, and petroleum projects. The development of large-scale mining operations at Climax Molybdenum is an example of the mighty power of explosives and their scientific application.

For 40 years, the development, manufacture, and practical application of explosives have been Hercules' business. Our representatives welcome the opportunity to consult with you on blasting problems.

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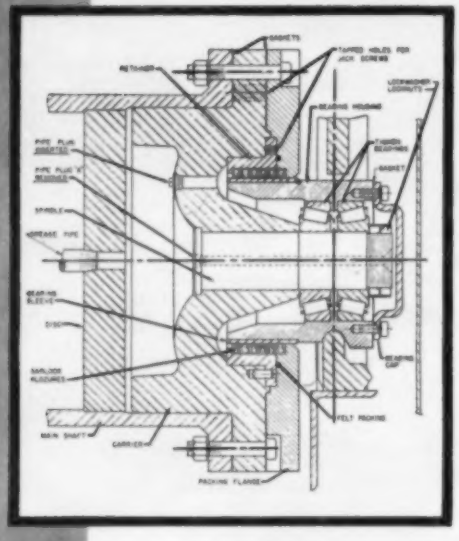
XR54-6

how AKINS

leadership in mechanical performance can help you cut costs

Classifiers and heavy media separators are selected on the basis of low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance. That's why so many successful mining companies throughout the world continue to order *and reorder* Akins.



for example...

the patented submerged bearing

- the Akins submerged stub-spindle bearing assembly is designed for equal distribution of radial and thrust loads between two tapered roller bearings. This design provides a sturdy bearing with less wear, lower initial and maintenance costs and dependable, continuous operation . . . one of the many Akins features which result in lower-cost-per-ton production.
- patented Akins method of lubrication through center of mainshaft eliminates grease pipes in pool and provides convenient, centralized lubrication of all grease fittings on main drive.

WRITE FOR CATALOG

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Stays out of the shop, stays on the job!

LE ROI TRANSO
Unitized design simplifies maintenance
4-wheel drive traction reduces engine strain and tire wear
Torque converter provides smooth flow of power... cushions shock

Le Roi-Transo TLF-150 Front-End Loader

YOUR first look at a Le Roi-Transo TLF-150 tells you it's got guts — guts aplenty! And Le Roi-Transo engineering is the reason.

Because of Le Roi-Transo engineering, your TLF-150 is seldom tied up in the shop. Because of Le Roi-Transo engineering, you load faster, travel faster, and dump faster — in sand, mud, snow, or rocky terrain.

Le Roi-Transo design assures you of less downtime these and other ways:

- Engine, transmission, clutches, axle assembly, and torque converter are grouped compactly and are easy to get at. You save maintenance, time and labor. For example, it takes *less than an hour* to replace the spring-loaded clutch.
- Patented "bucket-rocking action" helps you get a full bucket load within seconds, without tire-spin or undue strain on the loader.
- Torque converter assures smooth flow of power to all four wheels — gives you sure-footed traction, reduces engine strain and tire wear.

It's design details like these that help Le Roi-Transo TLF-150 save important time and money for you.

Have your Le Roi-Transo distributor arrange a demonstration, so you can see *all* the reasons why it pays to use a Le Roi-Transo TLF-150 on your material-handling jobs. TD-15

Note how compact arrangement of transmission, clutches, and torque converter puts transfer case conveniently at rear, so by merely removing the rear grill you can replace transmission clutch in less than 60 min.
TRANSO
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LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.
TRANSO DIVISION
MILWAUKEE 14, WISCONSIN
Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich.

100% AMOCO . . .

to keep it coming!

Photo courtesy Christopher Coal Company

Machine breakdown or faulty performance caused by improper lubrication can result in costly delay of coal production. Many large and important coal companies guard against such delays by protecting all mechanical equipment 100% with specialized Amoco Mine Lubricants.

From the big, heavy-duty Joy 11 B.U. Loader, shown above in action with operator, to shuttle cars and pumps, many large mines use Amoco Leaded Lubricants, Amerilube Greases, Amoco's Gear-amo 400, and American Hydraulic Oils. These products and Amoco consulting engineer service are available at convenient locations throughout *Amoco*al territory.

AMOCO LUBRICANTS
FOR MINE MACHINERY

AMERICAN OIL COMPANY ● FROM MAINE TO FLORIDA

Facts prove the economy of RUST-OLEUM®

Apply Directly Over Sound Rusted Surfaces

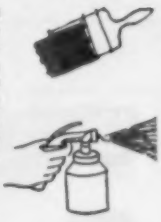
Just scrape and wirebrush to remove rust scale and loose particles — then brush Rust-Oleum 769 Damp-Proof Red Primer *directly over sound rusted surface.*

Lasts Longer Applied Directly Over Rust

Sandblasting, chemical pre-cleaning and other costly preparation methods are *not* usually required. Rust-Oleum penetrates the rust to bare metal, incorporating the rust particles into the coating.

Many Colors, Including Aluminum, and White

Rust-Oleum finish coatings incorporate the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer. They provide *double protection* and enable you to *beautify as you protect.*



Practical Answer to Your Rust-Producing Conditions

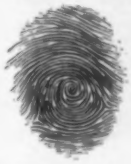
Rust-Oleum resists rain, snow, heat, fumes, sun, salt water, and chemicals. So easy to use by brush, dip, or spray that one man often does the work of two.

Proved Throughout Industry for Over 25 Years

Indoors and out, Rust-Oleum has *proved* its capacity to stop rust! Rust-Oleum can do the same for your tanks, metal sash, stacks, girders, roofs, buildings, machinery, pipes, etc.

An Exclusive Formula

Rust-Oleum is *distinctive* as your fingerprint. It incorporates a specially-processed fish oil vehicle that *dries*, is *odor-free*, and is formulated in *many colors*. Specify Rust-Oleum — accept no substitutes.



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Now . . . immediate delivery

CC-1
Medium-Duty Bit

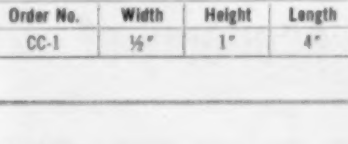
SPECIFICATIONS			
Order No.	Width	Height	Length
CC-1	½"	1"	4"

CC-2
Heavy-Duty Bit

SPECIFICATIONS			
Order No.	Width	Height	Length
CC-2	½"	1"	4"

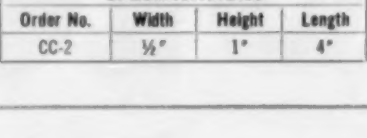
CCS-2
Heavy-Duty Bit with Stop

SPECIFICATIONS				
Order No.	Width	Height	Length	Stop
CCS-2	½"	1"	4"	1¼"



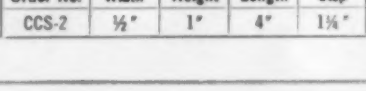
CC-3
Extra Heavy-Duty Bit

SPECIFICATIONS				
Order No.	Width	Height	Length	Stop
CC-3	½"	1"	3⅜"	1⅜"



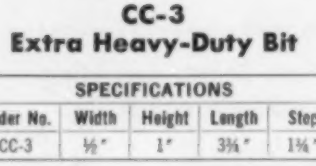
CC-4
Ripper Head Bit

SPECIFICATIONS			
Order No.	Width	Height	Length
CC-4	¾"	1½"	5⅛"



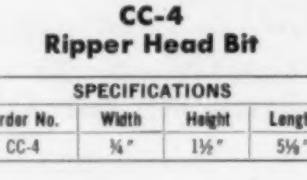
Finger Bit

SPECIFICATIONS			
Order No.	Width	Height	Length
FB-8-3	½"	½"	2¾"
FB-8-5	½"	½"	3"



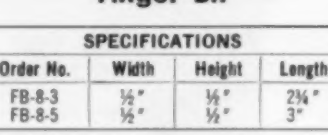
Square-Shank Auger Drill

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
AD-1½	1½"	3"	½"
AD-1⅝	1⅝"	3"	½"
AD-1¾	1¾"	3½"	½"
AD-1⅞	1⅞"	3⅞"	½"
AD-2	2"	3¹¹⁄₁₆"	⅝"
AD-2¼S	2¼"	3⅞"	⅝"



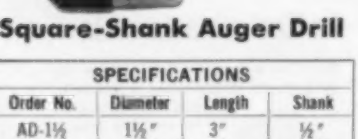
Hex-Shank Auger Drill

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
AD-2¼H	2¼"	4¼"	¹³⁄₁₆"
AD-2½	2½"	4⅝"	¹³⁄₁₆"
AD-2¾	2¾"	4¹¹⁄₁₆"	¹³⁄₁₆"
AD-3	3"	5⅜"	1⅛"



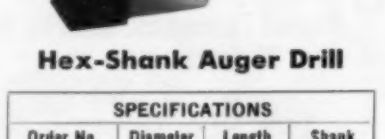
V-Prong Auger Drill

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
ADN-1⅜	1⅜"	3⅞"	½" sq.
ADN-1⅞	1⅞"	3⅞"	½" sq.
ADN-2	2"	3½"	⅝" sq.



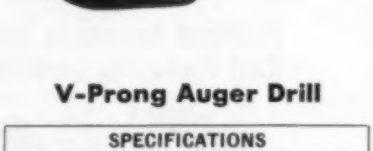
Roof-Bolting Drill
Solid Type

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
PT-1⅜	1⅜"	2³¹⁄₃₂"	½"
PT-1½	1½"	2³¹⁄₃₂"	½"



Roof-Bolting Drill
Solid Type with Waterway

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
PTH-1¾	1¾"	2³¹⁄₃₂"	½"
PTH-1⅜	1⅜"	2³¹⁄₃₂"	½"
PTH-1½	1½"	2³¹⁄₃₂"	½"



Roof-Bolting Drill
Prong Type

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
APT-1⅜	1⅜"	2¹⁵⁄₁₆"	½" sq.
APT-1½	1½"	2¹⁵⁄₁₆"	½" sq.
APT-1⅝	1⅝"	3 1⁄₁₆"	½" sq.

...on new, full line of Carboloy® mining tools

A single, local source—your Authorized Carboloy Mining Tool Distributor—is ready to handle all your requirements from "off the shelf" stocks

WHATEVER your mining tool needs, Carboloy Department now has the right tool—and it's immediately available from your Authorized Carboloy Mining Tool Distributor.

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PLUS: Mine-designed, mine-tested, and mine-proved Carboloy carbide tools. These tools, made by the oldest American carbide manufacturer, will drastically cut tool costs per ton.

REASON: The Carboloy organization, during the past 26 years, has built into its tools painstaking research, skillful engineering and rigid production standards. These built-in "extras" result in less tool breakage, longer tool life under any operating conditions.

Check your requirements against the tools on the opposite page—and order from your nearby Authorized Carboloy Mining Tool Distributor, listed below.

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Sinclair HEAVY DUTY BEARING GREASE is a greatly improved lubricant for bearings in power shovels, drag lines, tipples, conveyors and similar heavy duty equipment. It cuts wear by resisting shock, heavy loads, heat and pounding. It stays put – successfully lubricates large, loose-fitting bearings.

Sinclair GEAR PROTECTIVE COMPOUND provides a new high standard in exposed gear lubrication. Extreme pressure additives carry heavier loads – protect against wear. Moreover, this compound stays put, resists throw-off, squeeze-out or peeling.

Sinclair JET LUBRICANT #20 can prolong the working life of your turntables, rollers and roller rails. It is an all-season lubricant that resists squeeze-out – protects costly parts against shock and heavy, constant loads.

A Sinclair Lubrication Engineer can give you expert counsel on how you can get the most out of these cost cutting, time saving lubricants. Phone your local Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, New York.

SINCLAIR LUBRICANTS

Thermoid Conveyor Belting cuts handling costs on rugged mining jobs

There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples: HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; A —For slag, lime rock, crushed stone and other highly abrasive materials; C —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor can help you select the Conveyor Belt best suited to your requirements. Or if you prefer, write direct for Catalog #3679.

Conveyor & Elevator Belting • Transmission Belting
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"With this one detonator, we'll shoot every hole in the blast!"

"Remember, Primacord is an insensitive detonating fuse. It packs a terrific wallop! . . . detonates every cartridge in every hole. *But it must be detonated.* It can't be set off by sparks, friction or ordinary shock. Stray electrical currents don't affect it – *and a direct hit by lightning failed to detonate it!*

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"Then – and then only – tape your detonator snugly to the end of the trunk line, and fire with Safety Fuse or battery. Remember – *tape* it, because a good snug connection is just as important here as it is all along the line." P-18

Ask your explosives supplier or write for further facts to

THE ENSIGN-BICKFORD COMPANY
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PRIMACORD® *detonating fuse*

PROVED and APPROVED

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JUNE, 1954

IVAN A. GIVEN, EDITOR

Power for Progress

A MORE-SEARCHING LOOK at industry problems and at means of solving them is a natural accompaniment of a slump in business such as coal is now experiencing. The problems are particularly acute for commercial operators, who must depend largely or entirely on sales in open and competitive markets for income. In the bituminous industry, the fact that commercial operators from all over the country are tackling these problems in a spirit of grim determination through a series of working-type meetings is a most-significant indication that maximum power will be exerted for maximum progress.

Responsibility Accepted

The record indicates clearly that the commercial operators have been and are willing to accept responsibility for certain problems themselves, provided they are given an opportunity to do so and receive at least some help from where help must come. They have spent real money and have devoted real effort to reducing cost and enhancing product quality, though their efforts have been outpaced by increases in wages and other employee benefits. They will continue to spend money, time and effort to achieve further advances in cost and quality in the future—and in that effort certainly should have the benefit of a moratorium on additional demands.

Not Coal Alone

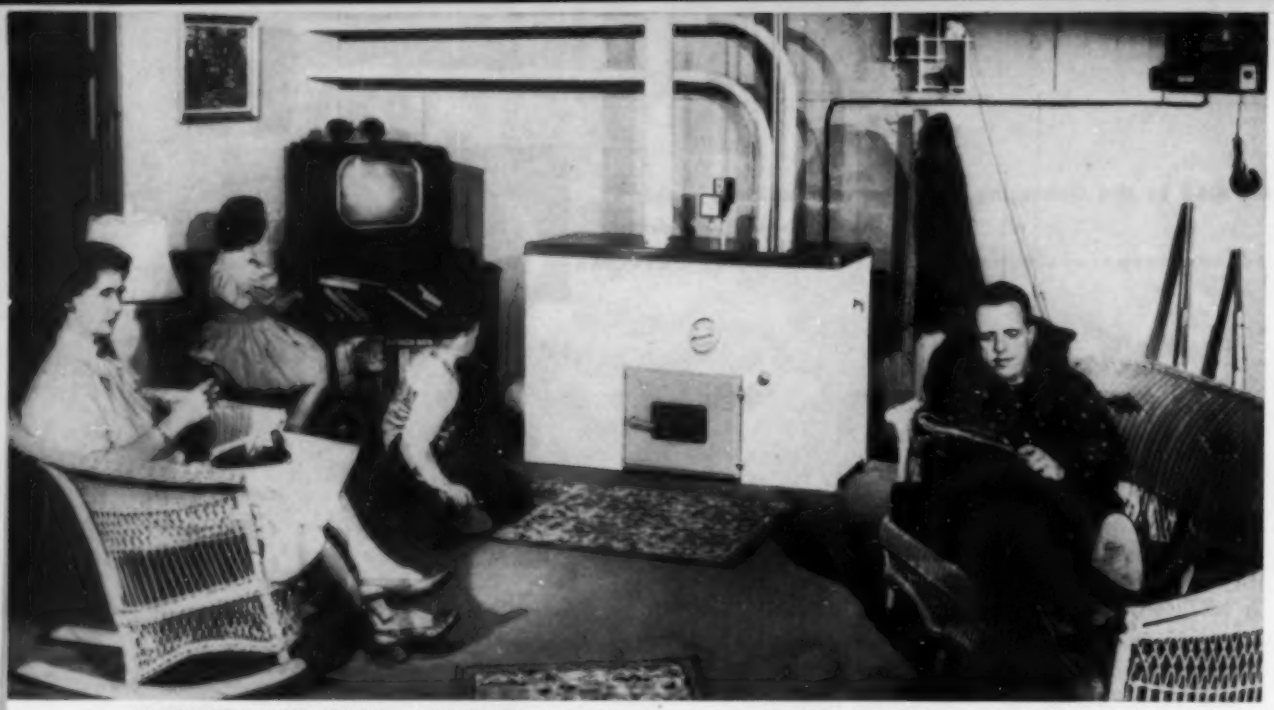
Coal also has shown its intention of accepting its share of the responsibility in other directions also, but here the problems are not coal's alone. Government, for example, is involved in many of the industry's problems, and a solution can only be reached if government does its part. These solutions must be reached not only for the sake of industry progress and ability to provide maximum employment at high wages, but because a sober regard for the future of the country demands a strong and healthy commercial coal-mining establishment. These are powerful reasons for asking that coal be given at least an even break in its efforts to serve the fuel and energy needs of the Nation.

Where Help Can Benefit

What things are involved in an even break? Among them are: (1) cessation of unfair competition from imported fuels, (2) development of a domestic fuels policy that will relieve coal of the burden of inferior uses of gaseous and liquid fuels, (3) fairness in taxation—depletion rates, for example, (4) consideration in the development of export opportunities, (5) fairness in the use of coal in tax-supported and tax-financed institutions, (6) relief from government-subsidized competition—hydroelectric and others, and (7) realism in freight rates. Coal can point the way but only Congress and the federal government and its agencies, state and local governments, and others can take the requisite action.

Power for Progress

Pointing out where others can and should help in no way implies that the industry is abdicating its responsibilities. Rather, it is accepting them in the fullest sense because without action in these directions fullest advantage cannot be taken of progress in other directions, including the vital one of better merchandising and market development. Concerted action means mass power and mass power in turn means maximum progress in solving the industry's problems. This alone is reason for welcoming this addition to the ranks of the organizations devoted to advancing the standing of coal.



AUTOMATIC ANTHRACITE EQUIPMENT provides trouble-free comfort and converts basement into clean, informal living area. Ash is swept from burner through sealed vacuum tubes. Coal is bin-fed through dust-tight tubes.

Coal Heat for Today's Homes

Today's coal-burning equipment provides automatic comfort, key to the home fuel market.

How does this new equipment work?

How does it restore coal's competitive strength?

What's needed to cash in on this new opportunity?

WRITE OFF COAL'S HOME-HEATING MARKET?

Not yet.

Too much is at stake. And there's too good an opportunity for making this market grow.

At stake for bituminous is a big share of the 70,000,000 tons that passes each year through retailer yards. This is a prize market, in which premium coals command a premium price and pay a rewarding profit to producer and retailer alike. For bituminous producers, it's the cream of their business, adding up to about $500,000,000 of gross revenues; for retailers, about twice as much.

At stake for anthracite is the bulk of production and the very life blood of the industry. For operators, it adds up to a $300,000,000 gross for 30,000,000 tons of production; for retailers, more than twice as much dollar revenue.

In the past few years, these markets have declined from higher levels. The principal reasons are:

1. An unprecedented series of warm winters.

2. The fast growth of automatic heating, successfully promoted by oil and natural gas.

3. A level of economic well-being that has encouraged householders to ignore the higher cost of rival fuels.

Today, however, coal has a good chance of holding onto the home-fuel market—a good chance of making it flourish, in fact.

Coal's opportunity today lies in the commercial availability of new, automatic burning equipment—equipment that provides anthracite and bituminous alike with persuasive selling aids.

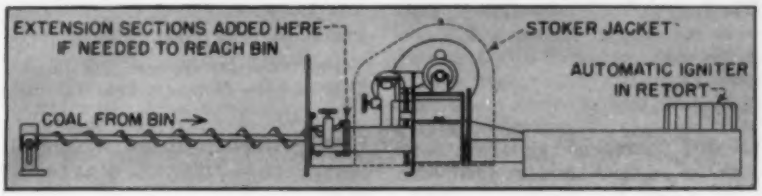
The characteristics of today's coal-burning equipment parallel the attributes that modern householders seek in heating equipment. Their views were revealed in a recent reader survey by *American Home* magazine.

"What are the most important factors in selecting a heating system?" that magazine asked its readers. They replied as follows:

Comfort and warmth	81%
Cleanliness	52%
Low operating cost	49%
Ease of operation	46%
Durability	46%
Low initial cost	7%
No answer	3%

When coal, burned in modern automatic equipment, is measured against the selection factors put forward by *American Home* readers, it moves out ahead of competing fuels. In com-

▲ **AUTOMATIC-IGNITION BITUMINOUS STOKER,** now in commercial production, adds new convenience to domestic coal-burning equipment. ▼



fort and warmth, operating economy and durability, today's equipment widens the gap by which coal always has led its rivals. In cleanliness and ease of operation, automatic equipment lifts coal to a competitive level with oil and gas. And any advantage that oil or gas still may have in first cost is pretty well offset by the superior longevity of coal equipment.

Making Comfort Automatic

HORSE-AND-BUGGY EQUIPMENT no longer need be an obstacle to coal's advance in the home-heating market. In other words, oil and gas no longer hold a monopoly on automatic comfort.

What does automatic warmth involve?

Any one of the following improvements is a step toward automaticity, and when all of them are designed into a burning unit, that unit thereby becomes completely automatic:

1. Adequate storage for reserve fuel, sealed to prevent escape of dust and located for convenient filling.

2. Regular filling of the bin by the fuel supplier on a schedule geared to degree-days.

3. Controls that transmit heat demands from living quarters to burning unit and circulatory system.

4. Quick, automatic response by the burning unit to demand for heat.

5. Sealed, automatic feed of fuel from storage to fire chamber.

6. Automatic removal of ash and other wastes without dust or dirt.

7. Plenty of hot water on demand.

From burning units now in commercial production and available on the open market, coal users today can obtain any degree of automaticity they want. Here are the equipment units now offered to householders:

ANTHRACITE CONVERSION UNITS

Capacity range—350 to 2,900 sq ft of radiation for boilers; 80,000 to 635,000 Btu per hour for warm-air systems.

Approximate installed cost—Range of $450 to $500, with bin feed and mechanical ash removal.

Conversion burners, using the conventional underfeed stoker, change almost any handfired boiler or furnace into an automatic or semi-automatic unit. To make the changeover, grates in the existing unit are replaced by a round retort. By means of a sealed tube from the fuel bin or from a hopper, screw conveyors feed coal upward through the retort. Ash spills over the outside rim of the retort if the retort is stationary. Some retorts rotate, however, pushing ash over the rim or removing it with wiper arms.

A single electric motor powers the coal feed, runs the forced-draft fan that provides air to the retort, and operates a mechanical ash-removal system, which deposits ashes in steel containers alongside the burning unit.

ANTHRACITE BOILER-BURNERS

Capacity range—350 to 1,083 sq ft of steam radiation.

Approximate installed cost—Range of $700 to $800, with bin feed and mechanical ash removal.

Three types of anthracite boiler burners now are on the market:

1. **Round-retort boiler burners** incorporating the conventional underfeed stoker are available from several manufacturers. All are built with steel boilers and either tank or tankless coils for year-round hot water. All are, or may be, fed directly from the storage bin. Ash may be removed by gravity to containers concealed in the base of the burner, by a screw conveyor or by a vacuum system.

2. **Cross-feed units** use a new principle of feeding anthracite across a rectangular retort at fire level. In one type of burner, fuel is fed automatically by gravity; in another type, automatically from the bin by means of a variable pitched worm. In one type, the grate is air cooled; in the other, water cooled. In both types, air for the retort is provided by a forced-draft fan as the coal moves across the rectangular burning area. Both types are built of steel and equipped with coils that provide automatic hot water. Ashes spill by gravity over the edge of the retort and into a receptacle in the burner base.

3. **The Anthratube** is a self-contained, steel-construction, overfeed boiler-burner adaptable to either type of radiator system, hot water or steam. Fuel is fed from bin to burning chamber through an Archimedes tube built into the unit. An induced-draft fan scrubs the combustion gases over the heating surfaces and keeps the entire system under partial vacuum. Thus the unit is self-cleaning and fly-ash never has to be removed from heating surfaces. Ash falls by gravity into a standard container at the base of the burner. When one container is full, it is withdrawn and replaced with another. Either a tank or a tankless coil provides year-round hot water.

ANTHRACITE FURNACE BURNERS

Capacity range—96,000 to 140,000 Btu per hour at the bonnet.

Approximate installed price—Range of $700 to $800, with bin feed and mechanical ash removal.

Anthracite furnace burners are used

with forced-circulation warm-air heating systems. They use either the round or the cross-feed retort, with fuel fed automatically from the bin. Ash may be removed mechanically to sealed containers beside the furnace, by gravity to standard containers concealed beneath the burner or by vacuum to containers outside the house.

AIR CONDITIONING WITH ANTHRACITE EQUIPMENT

Anthracite now is in position to move into the year-round air-conditioning market, providing the warmth side of the comfort cycle. Whatever the heating system—warm air, steam or hot water—anthracite fits in. All that's needed is a system of air ducts leading to those parts of the house to be air-conditioned. In the conventional warm-air system, winter comfort comes from circulation of heated, filtered, humidified air by means of a forced-draft blower. During the summer months, the same blower and the same duct system are used to circulate cleaned, unheated air through the house. If that isn't enough to keep the house comfortable, refrigerating and dehumidifying coils placed in a central duct will provide cool air for circulation.

To provide winter warmth for houses with boiler burners, radiators need be used only in selected rooms in the house, such as bath and kitchen. To warm other areas, steam or hot water is passed through a heater coil, much like a pair of automobile radiators back to back, installed in the central duct of an air-circulation system. Cleaned air, passed over the heater coil and humidified, moves through the duct system to the various rooms and warms them. In summer, the air system circulates cleaned air or, if needed, refrigerated air from air-cooling equipment, while the boiler continues to provide hot water.

GETTING RID OF ASHES

Whether the central heating system is automatic or handfired, anthracite users today need not fret about ashes. Convenient solutions either eliminate the problem or reduce it to a trifle.

Vacuum systems—Two types of vacuum ash removal are available for handfired as well as automatic equipment. In one system, ashes, reduced in size by a special grate installed in handfired equipment and by the ash-conveying screw in stokers, are screw-conveyed through a short tube from the base of the burner to a point where the vacuum system picks them up and draws them through sealed tubes to dust-tight containers outside the house, whence they may be hauled away like any other household refuse. In another system, a truck with its own vacuum-producing motor and fan sucks ashes from the base of the heater into the truck's ash container. This latter method of ash disposal is provided on a service basis, with the truck calling as often as needed through the season. Cost of the service may be added onto the price of coal—in the order of 50c per ton.

Mechanical systems—Most of today's anthracite stokers are equipped with a mechanical lifting device—a tube with conveying screw—that moves ashes from the base of the burner into standard dust-tight containers. The householder's only chore is, from time to time, to remove a full container and replace it with an empty one. Ordinarily, this requires no more than three trips per week to the basement during coldest weather; once a week or less in mild weather. Some retailers provide this service for a fee.

Season storage pit—In building a new home, one additional scoop with the excavating shovel provides an ash pit beneath the burner deep enough to hold a year's supply of ashes. In homes already built, with burner already installed, storage-pit excavation still is possible, though admittedly more troublesome and costly. The pit is equally suitable for handfired and automatic equipment. Cost of an annual ash-removal job shouldn't run more than $10 to $15.

Gravity ash removal—Many heating units, handfired as well as automatic, come equipped with ash containers made especially to fit the unit. They need only be slipped beneath the grate or retort. The user simply replaces a filled container with an empty one when the time comes.

CONTROLLING ANTHRACITE HEAT

Trouble-free operation of burning units is assured by controls that manufacturers provide as standard equipment for automatic burners. These controls include the following:

For steam systems: Thermostat to control room temperature; pressure limiter to guard against excessive pressure; aquastat to maintain water temperature; timer relay to hold fire; and low-water cutout to protect the boiler.

For hot-water systems: Thermostat, high- and low-limit aquastats and timer relay.

For warm-air systems: Thermostat, high- and low-limit switches and timer relay.

For handfired equipment: Ordinary handfired burning units become semi-automatic with the addition of (1) an ordinary thermostat which, by controlling damper and draft, assures even heat and makes it unnecessary for the householder to visit the basement more than twice a day even in the coldest weather; and (2) a vacuum ash-removal system that automatically swings into action when furnace grates are shaken. In addition to providing trouble-free semi-automatic operation, the thermostat also cuts heating costs measurably—as much as 30% in some homes, it is reported.

More Convenience With Bituminous

SHARPEST ADVANCE toward fully automatic heat with bituminous and today's brightest hope for recapturing the bituminous home market is the Campbell stoker.

Invented by David Campbell, of Indianapolis, tested by Bituminous Coal Research, Inc., promoted by retailer and producer groups, and manufactured and sold by Automatic Solid Fuels Equipment, Inc., Indianapolis, this equipment adds new features to the conventional bin-feed, underfeed, clinker-type stoker. These features, which add substantially to the accepted comfort, economy, cleanliness and convenience of the conventional stoker, include:

1. **An electric-resistance element** in the retort for igniting the coal. This replaces the usual hold-fire timer that turns on the conventional stoker for several minutes each hour and thus holds the fire when there is no heat demand. With the Campbell stoker, the fire dies if there is no heat demand.

2. **Electrical controls** that direct the action of the igniter. When heat is needed, a thermostat activates the igniter, which kindles a fire in the retort. With these controls, the system in mild weather does not overheat the house or accumulate ash.

3. **An air pick-up device** in the fan housing. By pressurizing the feed tube, this device prevents smokeback.

4. **Four steel ash containers.** These containers, used one after another as needed throughout the heating season, will hold the ash from 10 tons of coal plus the residue from incinerated household refuse—garbage, papers, cartons, grease containers, floor sweepings, tin cans and glass bottles. For

his own customers, Mr. Campbell empties these ash containers yearly.

Here's how the Campbell stoker works:

Maximum feed rate is 25 lb of coal per hour. Air is not controlled automatically but is regulated by fixed settings of the fan-inlet damper. When the living-area thermostat calls for heat, the stoker control turns on the igniter, a "Calrod"-like hard-alloy tube that houses a resistance element. The igniter, located in the retort, heats quickly to 1,430 F, well above the ignition tempearture of the coal, and remains on for a fixed time, usually 5 to 8 min. Heat from the igniter fires a small quantity of coal lying up against the igniter. The stoker control then starts the stoker itself, coal feeding begins and the fan blows the fuel to full flame. The fire then spreads completely around the retort.

If after 20 min the stack temperature has risen to 115 F, the stoker continues to operate. But if stack temperature does not rise to 115 F in that time, the stoker stops and the igniter starts again. This cycle is continued until ignition is obtained.

Why is the Campbell stoker likely to succeed in holding old coal customers and winning new ones where other stokers have lagged behind?

Here are the reasons for expecting success for the Campbell machine:

1. It incorporates new features, described above.

2. First cost runs from $75 to $100 below that of other bituminous stokers. Although first cost is not the prime consideration of a home owner, as the *American Home* survey points out, it does play a strong role among architects and home builders.

3. The manufacturer is sincerely dedicated to his product and convinced that it can be sold in increasing volume on its own merits.

4. The Campbell stoker, having taken shape within the bituminous industry, enlists the combined backing of bituminous producers, shippers and retailers. They have faith in this equipment and are backing it to the hilt.

5. The manufacturers have not frozen their design. They are open-minded to test results and suggested improvements. They believe they have the best bituminous home-heating equipment now on the market but they believe also that it can be further improved.

But even if the Campbell stoker were not in production, the bituminous industry still would have good equipment to promote for home heating. The truth is, a modern stoker of conventional design is a good buy for a householder. Most models now feed directly from the bin, which usually is sealed to prevent the spread of dust. With thermostats, aquastats, draft and stoker controls, they respond quickly to heat demand, maintain a plentiful supply of hot water the year around, produce little or no smoke or soot and require a minimum of attention from the householder.

Putting Coal Out in Front

A NEW OPPORTUNITY for coal to grow in the home-heating market—that's what today's advances in automatic and semi-automatic equipment add up to for anthracite and bituminous.

Measure this new equipment against the yardsticks set up by *American Home* readers:

Comfort and warmth—Automatic coal-burning equipment maintains an exact balance between heat demand and supply. This is a substantial advance over handfired equipment which, with its incandescent bed, already provided a more even heat, free of alternating blasts of chill and heat, than oil or gas. Thus, in the characteristic that *American Home* readers seek most eagerly in their heating systems, automatic coal heat widens the lead that coal already held.

Cleanliness—Sealed coal bins, sealed conveyors for fuel and ash, automatic ash removal and ash storage, and complete fuel combustion—all these items together put a ban on smoke, soot and dust. Thus automatic coal heat eliminates a complaint that formerly hurt coal badly.

Low operating cost—In most cities and towns, coal always has been and still remains the least expensive fuel. Today, automatic coal heat, with its precise matching of heat supply to demand, costs even less than hand fired heat. Home owners who have switched from oil or gas to automatic coal heat report annual fuel savings ranging from 25 to 50%. Look at Washington, D. C., for example, where coal competes with both oil and natural gas. In March, 1954, No. 1 Buckwheat and rice, the sizes used for automatic anthracite equipment, retailed at $18.70 per ton; bituminous stoker coal at about $15. At the same time, No. 2 fuel oil and natural gas each sold for some $28 per ton equivalent. In short, in economy, the criterion of third importance to *American Home* readers, automatic coal heat has a strong lead.

Ease of operation—Here, in the criterion of fourth importance to householders, was coal's most troublesome stumbling block until automatic coal heat came along. Now, home owners can throw away their shovels, as oil and gas have advised them to do, and still enjoy automatic warmth while they burn coal. Bin-feed equipment, mechanical and vacuum ash-handling and ash-removal services provided by coal retailers place coal, in convenience, on an equal footing with oil and gas.

Durability – Oil - heating experts claim a life expectancy of 15 yr for a conversion burner but they recommend a painstaking check at the end of 10 yr and replacement with a new unit if the old one needs extensive repairs. For a complete new boiler or furnace, oil people expect a life of 10 to 20 yr, with the same 10-yr inspection of the burning unit. The gas industry, pointing to the absence of moving parts in their burning equipment, claim a life of 15 to 20 yr for their units. If those claims for longevity look good, they are more than matched by the fact that today there are thousands of coal stokers still giving satisfactory service after 20 to 25 yr of reliable performance. In this respect, as in others, automatic coal heat outstrips oil and gas.

Low initial cost—Contrary to the belief of many coal men and the claims of heating-equipment makers, home builders and architects, the *American Home* figures show that few householders—only 7%—are swayed by first cost of heating systems. As pointed out, however, first cost is important to builders and architects, especially those who build for sale.

That attitude makes architects and builders a primary target for information on the merits of modern coal-burning equipment and its low lifetime cost. Figuring first cost throughout the expected life of burning equipment—oil at 15 yr, gas at 20 yr and the Campbell stoker and the Anthratube at 25 yr—capital cost per year for a conversion unit comes out at $21.50 for an oil burner, $14.25 for a gas burner, $13 for the Campbell unit and $18 for the Anthratube. For a complete boiler unit, annual capital cost runs something like this: oil, $47; gas, $32; Campbell stoker, $40; anthracite bin-feed unit with vacuum ash removal, $34.

With modern, automatic burning equipment available to give coal the

strongest position in meeting the six demands of householders who seek the best in home-heating systems, what else is needed to put coal out front, where it belongs, in the home-heating market?

The following are coal's big needs today:

1. Enthusiastic equipment makers, heating contractors and equipment dealers who are convinced of the merits of coal for heating homes and the excellence of their own equipment. To win the enthusiastic participation of these men in the sale of coal-burning equipment, the coal industry needs market research that will reveal who and where coal's home customers are, what virtues they want in their heating systems and how big the market for automatic home-heating equipment is. Armed with these facts, coal men—producers and retailers together—will be in position to show manufacturers, heating contractors and dealers, the sales and profits opportunities in assembly-line production and aggressive sale of modern heating systems.

2. Well-informed architects and builders, who know the variety and virtues of today's automatic coal-burning equipment, the convenience and satisfaction it provides and the dollars it saves. A big step in educating this group was the recent month-long display of automatic anthracite equipment staged in New York City. This exhibit attracted not only prospective and present home owners but also architects, real-estate development interests, heating-equipment dealers, home builders and writers for "shelter" magazines, newspaper "home-making" departments and business publications. More and better displays of this kind, by bituminous as well as anthracite, would spread information and rouse interest where information and interest count.

3. A switch in sales approach by equipment makers, heating contractors, equipment dealers, retailers and coal producers, involving less emphasis on the fuel concerned and more emphasis on the results obtained —comfort, cleanliness and convenience.

4. Promotion of architects' plans and specifications for homes heated with coal. The Small Homes Council, University of Illinois, Urbana, Ill., has drawn plans for several types and sizes of home, all designed to provide the utmost in convenience, comfort and economy with coal. The council also has published supplementary data on such subjects as chimney construction, home insulation, basement design and coal- and ash-storage facilities. In all this, both anthracite and bituminous have a strong but not yet fully exploited selling tool.

5. Fresh techniques in merchandising and selling coal-burning equipment and controls. For coal, there may be potential profits in a leaf from the book of the safety-razor people. These men practically give away razors, figuring that a man who owns a razor will buy enough blades during the life of the razor to provide the manufacturer with a gratifying profit. Along this line, and possibly spurred by the same kind of thinking, two big anthracite companies recently launched ingenious new plans to sell automatic and other heating equipment for home use. Delaware, Lackawanna & Western Coal Co., sales subsidiary of Glen Alden Coal Co., has agreed with Electric Furnace-Man, Inc., that DL&W will be exclusive agent for EF-M automatic equipment sold to anthracite dealers while Electric Furnace-Man, Inc., expands its sales through heating and plumbing contractors. Under the DL &W retailer plan, the retailer earns refund credits for his purchases of DL&W coal. These credits may be applied against the dealer's purchase of EF-M automatic equipment, thus enabling him to reduce the price of automatic equipment sold to householders.

The Hudson Coal Co. recently launched a similar plan that provides a refund credit, geared to purchases of Hudson or Hudson Sterling coal and to sales of any approved anthracite heating equipment installed in the present coal year. The refund credit may be applied to reduce the price of new heating equipment and controls to customers, or for any other purpose such as advertising or customer service.

Elsewhere, in several cities, groups of anthracite dealers, backed by producers whose coal they sell, are offering thermostats to their customers at something like one-third of the usual cost. They count on this campaign to keep owners of handfired equipment from switching to oil or gas.

6. Exchange of research and development information between the bituminous and anthracite industries. For example, bituminous researchers now are studying means of adapting the anthracite-developed Fire-Jet commercial burner for bituminous use. Doubtless there are other developments that also could be made equally useful to both industries in the home-heating market as well as elsewhere.

7. Wider and stronger support among coal men—producers, shippers and retailers—for organizations that are set up to manufacture and market products that have been or may be developed to utilize coal, especially in the home. The burden of broadcasting information about equipment that is available or on the threshhold of availability should not have to rest entirely with these corporations. Producers and retailers alike who are interested in maintaining and enlarging their present markets should eagerly seek out this information for their own benefit and pass it along to their customers and those who help select burning equipment.

8. Continued research looking to still further improvements in automatic coal burning for the home. Such research, directed especially at the ash-and clinker-removal problem, is critically needed by bituminous. Considerable study also must be given to cutting the cost of such equipment. Naturally, research will cost money. The funds must be provided by those who stand to gain by the results of research—coal producers, retailers, equipment manufacturers and associated interests.

9. Improved service to householders who burn coal.

What kind of services are needed to put coal on an equal footing with oil and gas?

Here are a few:

Bin service, with the dealer responsible for watching the degree-day chart and gearing deliveries to indicated needs and with the truck driver trained to make a clean, dustless and quiet delivery.

Maintenance service, providing seasonal inspection of conveyor systems, gear boxes, motors, stoker fan, blower, retort, air system, electrical controls and chimney, plus replacement of worn items and a clean-up of dust wherever it may have accumulated.

Emergency service, assuring the customer that skilled men and a supply of spare parts are available.

Ash removal on a schedule and with a system to fit the customer's needs and wants, thus relieving him of an unpleasant chore hitherto associated with coal heat.

10. Replacement of defeatism with confidence among coal producers and retailers, this new attitude being based on assurance that coal, the abundant and dependable fuel, now can be burned in equipment that matches its merits.

EFFECTIVENESS OF 30-deg sloping sideboards that tend to move the coal toward the center instead of spilling it over the sides (left photo) is clearly shown in shuttle-car roadway (right), still practically free of coal 45 days after opening the section. No cleaning has been done. Boom deflector made of half an 8-in pipe (arrow, left) prevents damage to conveyor.

Changes Improve Shuttle Cars

ELIMINATION of roadway clean-up labor is the result of one of four important alterations made in shuttle cars operating in Mine No. 1 of the Amherst Coal Co., Amherstdale, W. Va. Other company revisions have speeded inspection and reduced maintenance and down time. The photographs were made in Mine 1-C and the shuttle car is a Joy Type 32E-15. The changes, being made as the shuttle cars are rebuilt in a new central shop the company has established for that purpose adjacent to the central warehouse at Accoville, W. Va., include:

1. Addition of 30-deg sloping sideboards to the car. While the improvement has practically eliminated coal spillage over the side onto the roadways and also conserves coal, the slope is not great enough to shed all the coal when dumping. This is considered only a minor disadvantage, however, compared to the other benefits. More slope could be secured only by increasing the car height beyond desirable limits. Effectiveness of the sideboards is indicated by the roadway photograph taken on a pillar section 100 ft inby the elevator after the section had been in operation 45 days and before any cleaning had been done.

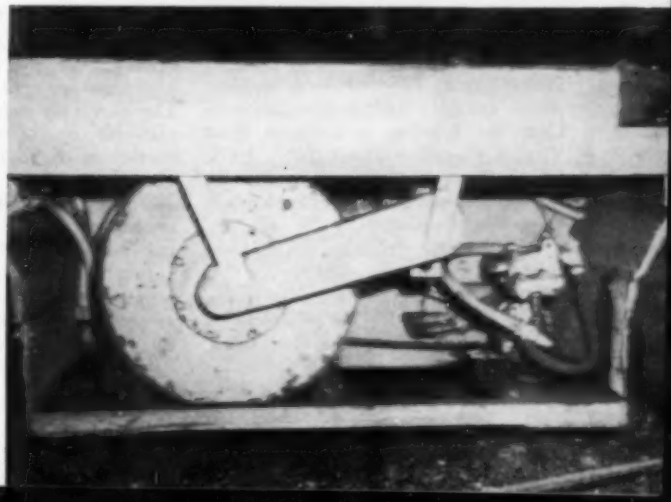
2. Installation of a deflector to prevent damage to the shuttle-car conveyor by inadvertent lowering of the loader boom. The deflector, put on the front end of the car (left photo, above), consists of one-half of an 8-in-diameter pipe welded to the frame.

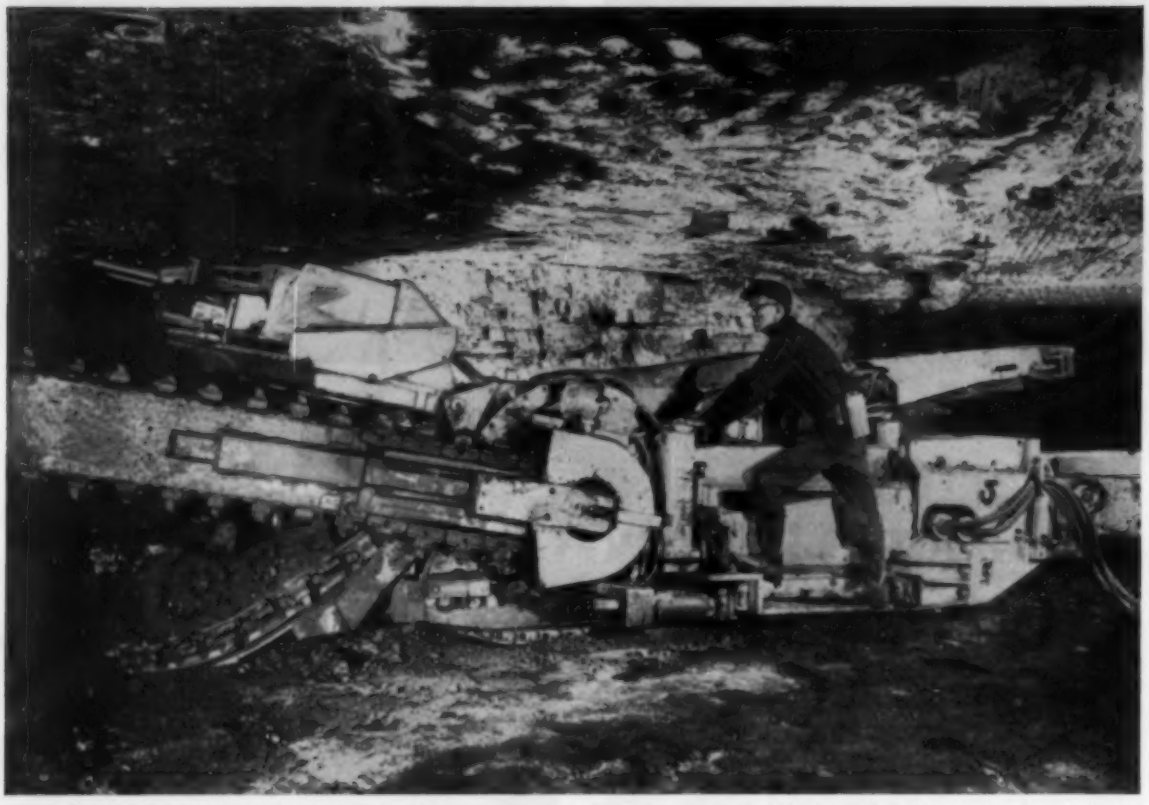
3. Use of a new-design guard over the speed reducer to materially help inspection and maintenance. Instead of the original guard kept closed by cap screws, the new guard lifts completely off and is held in place by only one wedge. The guard also has holes to serve as convenient hand holds for lifting.

4. Elimination of the large plate guard covering the reel and its drive chain and substitution of a small enclosure built around the chain to act as a guard and to facilitate lubrication. Disadvantages of the old-type guard were accumulations of dirt and coal in the enclosed space, plus the time required to remove the guard for inspection and repair.

NEW SPEED-REDUCER GUARD is easily removed by pulling wedge and using the hand holes to lift it off.

GUARD OVER THE CHAIN ONLY, instead of a large plate over cable reel, speeds lubrication and cleaning.





DESIGNED FOR HIGH TONS PER MAN with a small crew, the Konnerth miner is shown here in barrier extraction at Palmer mine. Crews total 3 or 4 men and unit output ranges from 120 to 250 tons, averaging 160 tons at Karen mine in 1953.

The Konnerth Miner

How U. S. Steel uses new unit in . . .

1. **Concentrated production in a new operation**
2. **Barrier and chain-pillar recovery in an old mine**

BEGINNING with the first machine of the present type in September, 1952, a total of 40 Konnerth miners, developed by Karl L. Konnerth, vice president of coal operations for the United States Steel Corp., are now in operation or ready for installation at three mines in the corporation's Frick district coal division in Western Pennsylvania. Thirty-three other machines are on order for installation in Cary No. 2 mine, in southern West Virginia, starting about July, 1954, and it is expected that the machines will go into all U. S. Steel coal mines as production permits.

Applications to date range from concentrated room-and-pillar in 7-ft coal in a new mine (Karen) to recovery of barrier and chain pillars in an old operation where the coal thickness is 8 ft. (Palmer mine). By mines, the present 40 machines are allocated as follows: Karen, 12 operating, 2 spares; Robena, 12 operating, 3 spares; Palmer, 8 operating, 3 spares.

HIGH TPM THE GOAL

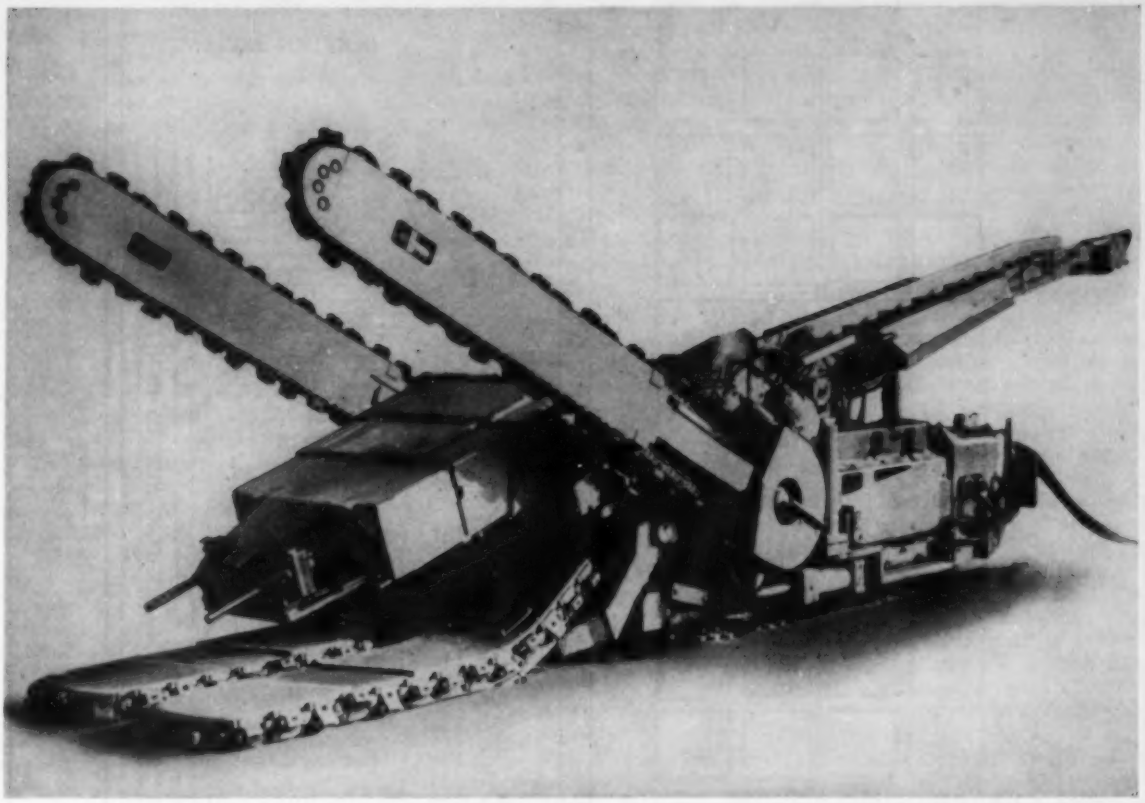
A major goal in the design and operation of the Konnerth miner is high tons per man with a small crew. The aim is an average of 40 tons per man-shift to the parting, although a maximum of 85 has been achieved. Crews are made up of 3 or 4 men, and the production per machine-shift ranges from 120 to 250 tons, with the maximum so far 257 tons.

Production at Karen mine is 4,000 tons per day with an average of 300 employees. This tonnage is supplied by 12 machines working two shifts. The Karen machines averaged 160 tons per shift in 1953. Except for necessary entry advancement the entire output comes from a single panel at Karen.

In barrier and chain-pillar recovery at Palmer, production is expected to average 2,800 tons when conversion is complete and all eight machines are in regular operation. With 364 men and four units in production at the time this report was prepared, plus hand recovery, the output was averaging 1,800 tons. Three of the machines were operating three shifts and one two shifts.

HOW THE MINER WORKS

Key principle of the Konnerth miner is the use of vibration to break down the coal after it is blocked out by undercutting and shearing on two sides. The vibration is imparted to the coal by two electrically actuated hammers mounted on a telescopic carriage. Actuation is provided by electromagnets consisting of cylindrical coils in which a core slides back and



Frontal Attack, Undercutting and Shearing, Vibration Breaking Feature Konnerth Miner

DEVELOPED BY: Karl L. Konnerth, vice president, coal operations, United States Steel Corp.

BUILT BY: Jeffrey Mfg. Co., which acquired the patents Jan. 1, 1954; Jeffrey name, Model 34-F.

OPERATING PRINCIPLE: Frontal attack, using vibration to break down the coal in blocks approximately 6½ ft wide and 4½ ft deep after undercutting and side shearing. Design also permits shooting where tough coal slows down production by vibration.

UNDERCUTTING: Two bars with 11-in space between equipped with 43-block chains operating at 315 fpm. Blocks connected with universals to permit chain to follow vertical angle in bar. The chains also gather the coal and move it back through the center opening to the hopper feeding the loading conveyor.

SHEARING: Two standard 9-ft-9-in bars mounted for independent operation. Bars equipped with standard 41-block chains operating at 390 fpm.

SUMPING: Machine advanced by crawlers at 36 in per min; tramming speed in moving, 104 fpm.

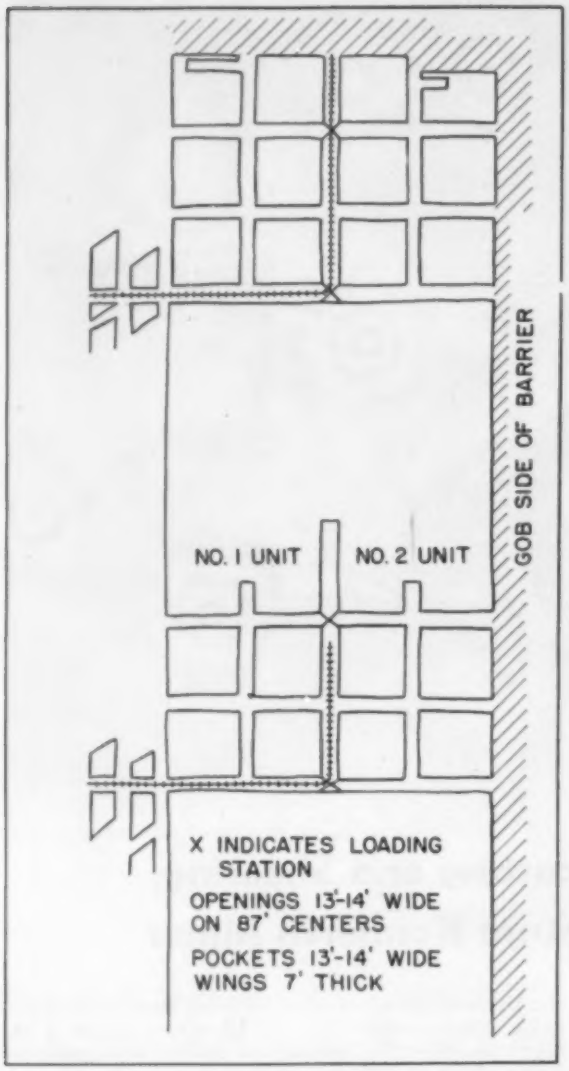
COAL BREAKING: Performed by vibration imparted by two hammers transmitting 1,800 15-ton blows per minute. Hydraulic cylinders raise and lower hammer carriage, swing it from side to side, and advance or retract it 34 in to break down the coal and trim the roof to a maximum height of 80 in with the standard machine. A separate m-g set provides power for operating the hammers and includes starting resistance and contactors for the machine motor. Sectionalized cables connect to the machine.

LOADING: Single-chain flight conveyor from hopper to shuttle car, 290 fpm. Loading boom 8 ft long; swing, 65 deg each way; maximum lift at discharge end, 38 in above horizontal.

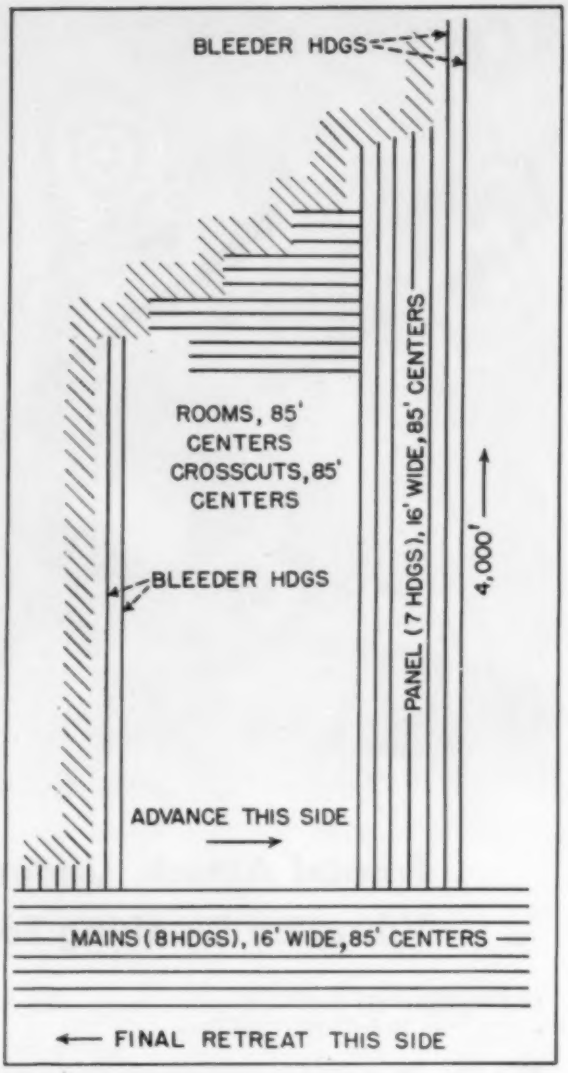
DIMENSIONS, STANDARD MODEL: Width, 6 ft 6 in; length over main body, 22 ft 6 in, length over rear conveyor, 30 ft 6 in; tramming height, 48 in; maximum mining height, 80 in; weight, approximately 46,000 lb.

MACHINE POWER: Totally enclosed compound-wound fan-cooled DC motor; 70 hp for 3 hr or 90 hp for 1 hr.

CONTROL: Control levers provided on both sides 11 ft back from ends of cutter bars; also, emergency stop buttons on both sides. Cutting, tramming and conveying are controlled through hydraulically operated disk clutches; all positioning handled by an independent hydraulic system.


GOB SIDE OF BARRIER
NO. 1 UNIT
NO. 2 UNIT
X INDICATES LOADING STATION
OPENINGS 13'-14' WIDE ON 87' CENTERS
POCKETS 13'-14' WIDE WINGS 7' THICK

ONE PLAN of attack in barrier extraction at Palmer mine is shown diagrammatically in this sketch. Loading stations are established every other place.



CONCENTRATED RETREAT at Karen mine, shown diagrammatically, provides most of the 4,000-ton daily output from one panel operated two shifts.

Barrier and Retreat Mining With Konnerth Unit

forth between a stop at the back end and a vibrating tool shank at the front end. Each coil is alternately excited by single-phase AC through an oil-immersed selenium rectifier supplied with 150-vs 30 cycle power by a portable explosion-tested m-g set consisting of a 15-hp DC motor directly connected to a 28.8-kva 160-v 30-cycle generator with 3-kw exciter.

The m-g set and also the starting resistance and contactors for the DC machine motor are mounted on a three-wheeled truck parked in a crosscut usually not farther than 550 ft back of the face. The maximum distance is controlled by the practicable length of the cables. Overall AC output to the hammer is 80 to 90 amp, and is provided through a 9-conductor cable which, like all other cables, is sectionalized for easy handling.

Development of the hammer mechanism included trial of units with speeds higher than 1,800 blows per minute, which caused the tools to drill into the coal rather than break it, and also less than 1,800, which did not provide enough force to bring down the coal. With a frequency of 1,800, good breaking is obtained over a wide range of coal characteristics.

The vibrating principle permits mining in many instances without shooting. However, drilling and shooting can be done where breaking conditions slow production unduly, and this feature is cited as one of the unit's advantages. Others include:

1. Flexibility in attack on the face and in moving from one working place to the next, simplifying operation and facilitating proper development of working places, in addition to making the unit readily adaptable to present-day mining systems.

2. Maximum safety for the operating crew, with the runner 11 ft back

from the ends of the bars and an excellent opportunity to keep bolting up to the face at all times.

3. Minimum dust, with sprays at all critical points.

4. Clean working places because of floor-loading design.

ADVANCING THE FACE

To achieve the normal width of place with the Konnerth miner, faces are advanced by alternating from side to side with the machine. Where mining is done without shooting, and starting on the left, for example, the machine is trammed ahead at sumping speed for about 4½ ft, which also sumps the shearing bars. Then the shearing cuts are completed and the hammers are advanced to break down the coal. If required, the hammer carriage is raised and swung as necessary to trim the top.

Where 7 ft of coal height is taken, one pass usually provides enough coal to load a shuttle car. The machine then moves to the right side and the cycle is repeated. Bolting of the roof to the face is started as soon as the machine moves over, and thus maximum protection is provided at all times. A portable screen is set up against the head of the miner to protect the men doing the bolting. Another advantage cited for the machine is that it is free to continue mining and breaking down the coal while the shuttle car is away, thus maintaining production.

Shooting is done where the coal is tough and consequently vibration breaking takes too much time. This is the case at Karen mine, where places are driven 16 ft wide. Starting with the face shot and loose coal down, the miner first advances and loads the coal in the center of the place, trimming the roof with the hammers as necessary. The miner then moves to the left side of the place, loads the loose coal and trims the roof. When it reaches the solid face, the shear and undercutting bars are positioned, the machine is sumped approximately 4½ ft, and the downward shears are completed. The machine then moves to the right.

While the machine works at the right, two crew men set up the temporary protective screen and install bolts at the left and in the center. Upon completion of the right-hand sumping cut, the machine moves back 10 ft and the third bolt is installed on the right. Karen mine is in an area of the Pittsburgh seam where heretofore it has been necessary to take down and haul out the "river drawslate." Elimination of shock to the roof as a result of machine mining and good support of the overlying measures through in-cycle roof-bolting has improved conditions so that "not a pound of drawslate has had to be loaded out."

The three sections of the face at Karen are shot with three holes, each loaded with two sticks of permissible. One hole is drilled in the left-hand block, one in the right and one in the narrow center block between the two. The holes are shot one at a time and the cycle is repeated. A patent on this system of face mining has been applied for.

FACE HAULAGE

Two Konnerth units normally work from a common transfer station. Each unit at Palmer consists of a Konnerth miner, General Electric elevated-discharge shuttle car, stoper with United Engineers dust collector, Joy compressor with winch and wire line for moving, Westinghouse m-g set, Joy Safety Circuit Centers, MSA Bantam rock duster and other service equipment. A Stamler hydraulic car spotter handles trip positioning at the common loading station. One shuttle car uses one side of the loading station and the second serving the other unit uses the opposite side.

The crews of 3 or 4 men handle everything involved in mining the coal and delivering it to the loading station, and consist of a Konnerth operator and 2 or 3 helpers, who take care of all other work in the section. One foreman normally supervises two units and the helpers can handle the miner if necessary.

PALMER BARRIER RECOVERY

Mining of chain and barrier pillars is the goal of present operations at Palmer mine. Chain pillars are recovered as circumstances dictate, although the general pattern is followed in location of loading stations, length of shuttle-car haul and the like.

In barriers of sufficient thickness, the coal is split up into blocks on 87-ft centers by openings 13 to 14 ft wide. The plan varies with the circumstances but in general chutes are driven across at intervals of 400 to 600 ft to open up the barriers. Where possible, these chutes are put through chain pillars, as indicated in the accompanying diagrammatic sketch, to reduce the cleanup of old openings and provide better conditions.

As one group of places is brought back, another group is started and advanced to meet it, with loading stations and track placed generally as shown in the sketch: i.e., a loading station every second or third place with tail track approximately 100 ft long. When recovery requires shortening the tail track excessively, the next loading station is placed in operation.

Pillars are recovered by driving pockets 13 to 14 ft wide across them, leaving wings 7 ft thick against the gob. These wings are recovered by mining off the ends starting at the gob side, using breaker props for additional protection.

CONCENTRATION AT KAREN

The general plan of mining at the new Karen operation envisages recovery of half the coal reserves on one side on the advance, and of the remainder on the other side on the retreat. Except for necessary entry advancement, all the production, averaging 4,000 tpd, comes from a single panel.

Full retreat in panels approximately 4,000 ft long is the goal at Karen. The main entry is approximately in the middle of the property, and consists of eight headings 16 ft wide on 75-ft centers. Panel entries are made up of seven headings 16 ft wide on 85-ft centers, and are developed at intervals providing "rooms" 1,020 ft long. Room and crosscut centers are 85 ft.

The accompanying sketch shows diagrammatically the plan expected to be employed at Karen when development is sufficiently advanced. When the panel entry reaches its limit, rooms are developed in groups of three, and pillaring is started as soon as the rooms cut through the previous mined-out panel. When the line advances far enough, the entry pillars are picked up, with the exception of two on the solid side, which are left to provide two bleeder headings. Thus, with the bleeder headings left in mining the previous panel, sets are provided on both sides of the rib line.

At times, all of the 12 operating units at Karen can be located in a single panel, but the usual number will be 10, with 6 to 8 actually pillaring and the remainder driving new rooms to keep the pillar line going.

Two machines work in three places, plus crosscuts or pockets. Track is placed in the center room as the groups are advanced, and loading stations are developed every third crosscut, or at intervals of 255 ft. Trips are pushed in on the tail track, and the shuttle cars, one for each miner, use opposite sides of the loading stations.

Pillars are mined at Karen by the pocket-and-wing system, with pockets 16 ft wide. Wings 5 ft thick are recovered by working them off the gob ends on the retreat out of the pocket.

BIG 45-yd electric shovel sets the pace in overburden removal at Central Ohio Coal Co.'s new Muskingum mine. Weighing 1,700 tons, the unit has a 130-ft reach. An 18-yd unit uncovers coal in a second pit.

Central Ohio Coal Gears Strip Mine to Serve Nearby Power Plant

Dual stripping, twin-flow cleaning and a 4½-mi overland belt to the power plant highlight design at new Muskingum mine.

By A. E. FLOWERS

Associate Editor, COAL AGE

JUST AS IMPORTANT as the equipment shown here is where it is working. For without the nearby power-generating plant, there would be no coal mine.

It takes 1,200,000 tons of coal per year to feed the hungry generators of The Ohio Power Co.'s new $50,000,000 Muskingum River plant near Beverly, Ohio. That production job is handled by this equipment at the Central Ohio Coal Co.'s new Muskingum strip mine located 4½ mi from the power plant. Central Ohio Coal is a subsidiary of the Ohio Power Co., which in turn is a subsidiary of the American Gas & Electric Co. Commerical operation of the mine, preparation plant and the belt-conveyor system connecting them to the power plant began Jan. 27, 1954.

Capacity to supply the daily needs of the two 200,000-kw reheat-type generator units to be installed in the new power plant was the keynote in laying out the mine property and in selecting the large-capacity stripping and loading equipment. Plans called for single-shift coal loading 5 days a week and stripping on a 3-shift basis.

Tonnage requirements necessitated that the stripping units uncover overburden at an average rate of at least 1,250,000 cu yd per month. To assure continuous production, management decided to incorporate double facilities in the strip pit and preparation plant.

The mining limit at the south end of the property is about 1 mi north of Unionville and the northern boundary connects with the Cumberland No. 3 mine of Central Ohio Coal Co.

The topography in the tract is hilly and wooded and access to the property was possible only by secondary roads before the mine was opened. Two main streams, Meigs Creek in the west and Dyes Fork in the east, cut the property in north-south directions.

SELECTING THE EQUIPMENT

As a result of these considerations, a 45-yd Marion 5561 electric shovel was selected as the main stripping

CENTER OF ACTIVITY is around the twin-flow preparation plant. Seven trucks, shown here at the end of the shift, deliver coal from the strip pit. Clean-coal stockpile feeds 4½-mi overland belt conveyor system leading to power plant. Office, shop and supply buildings add to the eye-filling scene.

unit and an 18-yd Marion 5323 electric shovel was teamed with it to provide stripping capacity well above that needed to produce the required tonnage. Both shovels are equipped with Lincoln centralized lubrication systems and General Electric power units and Amplidyne controls.

A group of four truck-mounted McCarthy overburden drills was initially selected for the job of drilling 6-in blastholes. Since the topography of the area did not lend itself well to vertical drilling, three horizontal units were purchased to handle most of the drilling, while the fourth, a vertical unit, was acquired for special assignments.

To match single-shift coal-loading capacity with triple-shift stripping, a Marion 4161 electric shovel with an 8-yard Marion coal-loading dipper was assigned to the same pit as the 45-yd stripping unit, and a Marion 111M electric shovel with a 7-yd Esco coal-loading dipper was teamed with the 18-yd unit.

Haulage units were selected with economy of operation and future needs in mind. Seven 40-ton Euclid bottom-dump tractor-trailer units, with power steering and capable of traveling 30 mph with a full load, currently are handling the job with ease. Trucks are powered by 300-hp Cummins NHRS diesel engines.

To assure a fuel of consistent quality for the power plant, a preparation plant was included in the original planning. However, a conventionally designed plant could be a bottleneck in the coal flow to the power plant if a major breakdown occurred. Therefore management decided to incorporate two parallel coal flows in the plant. The goal in the twin plant was to permit each half of the plant to operate independently of the other.

NEW POWER PLANT on the Muskingum River has the two largest reheat-type generating units in the nation and is one of the most economical anywhere.

To assure a constant feed to the plant, a 100-ton truck bin and a 600-ton 5x0 surge bin were included in the plant design. Design and erection of the preparation plant were handled by Roberts & Schaefer Co.

A surge pile of clean coal, currently about 9,000 tons, is maintained at the cleaning plant to eliminate surges and provide for uniform loading of the 4½-mi belt system connecting the preparation plant with the power plant. Coal also is stored at the power plant. The 4½-mi belt installation is reported to be the longest permanent open-air overland belt line in this country.

Frank Coulson, mine manager, who has his office in Zanesville, Ohio, was in charge of the construction project for Central Ohio Coal from the time ground was broken until the plant was completed. Assisting him in the job was Sandy Erickson, superintendent in charge of the Muskingum mine.

Officials of the Central Ohio Coal Co. headquartering in New York include Philip Sporn, president; Graham Claytor, vice president; H. A. Kammer, vice president; and W. J. Rude, assistant vice president. Harold Turner, vice president, has his headquarters in Canton, Ohio.

MINING CONDITIONS

Mining is in the Meigs Creek or Ohio No. 9 seam. The coal averages 42 in in thickness and is consistent in character for that seam throughout the mining area. The seam lies practically flat, pitching to the south and east only 15 ft to the mile. At the southern end of the property, the coal outcrops about 200 ft above drainage.

The coal is underlain by a soft fireclay. Immediately over the coal is a 2- to 4-ft layer of dark shale. In geologic sequence above the dark shale

SIDEWALL DRILL works on top of the coal while preparing blastholes. Three units handle drilling job in both pits.

BOTTOM-DUMP TRUCKS fill 100-ton bin feeding coal to plant. Rotary breaker reduces coal to 5x0.

TYPICAL coal-loading scene shows dozer cleaning coal as shovel loads 40-ton tractor-trailer unit. Supervisors keep close check on coal quality in pit.

are 11 ft of friable green shale, 14 ft of limestone with clay seams, 3 ft of limey shale, 24 ft of clay and limestone boulders and 18 ft of surface material.

OVERBURDEN PREPARATION

Variations in overburden thickness, type of rock and the physical properties of each, and the presence or absence of clay seams demanded a flexible method of drilling and blasting. Spacing of blastholes varies with the type and quantity of material covering the coal and responsibility for good bank preparation is placed on the pit foreman. Holes are started in the shale about 6 ft above the top of the coal, are angled slightly upward and are drilled 40 ft deep.

STRIPPING METHODS

The big 45-yd shovel began stripping on the west side of Dyes Fork at the southern extremity of the property and has been advancing northward ever since. The 18-yd unit began stripping northward on the east side of Dyes Fork opposite the 45-yd unit. Each shovel takes two or more cuts to remove up to a maximum of 80 ft of overburden. In making the first cut, the 18-yd shovel works a pit 110 ft wide while the 45-yd unit removes a 120-ft swath. Succeeding cuts by both units are made 40 to 50 ft wide until the 80-ft wall is reached.

Mine management plans stripping so that spoil can be placed systematically to make reclamation work as simple as possible. Considerable saving will result because the backfilling and leveling required will be held to a minimum.

CLEANING IN THE PIT

An Allis-Chalmers HD20 bulldozer with a Gar Wood cable-controlled blade is assigned to each loading pit to remove fine rock and dirt from the top of the coal. An Allis-Chalmers AD40 road grader alternately works in each pit to scrape any remaining fine material off the coal and keep haulage roads smooth. The bulldozers also are available for miscellaneous jobs on road maintenance and reclamation.

LOADING AND HAULING

Four of the seven 40-ton tractor-trailer units are assigned to the west pit where the 8-yd coal-loading shovel follows the 45-yd stripping unit. The remaining three serve the 7-yd coal shovel.

At the present time, maximum round-trip haulage distance between the pit and bin is about 2 mi. Since the mine has been operating only a few months, pit haulage must, of necessity, be on top of the coal, except for the short inclines leading from the coal outcrop to the 100-ton truck bin at the cleaning plant. Later after all the coal has been removed, the company plans the installation of a permanent high-speed haulage road, measuring 70 ft from ditch to ditch, with a 50-ft crown and held to a maximum grade of 2%.

SUPPLY AND MAINTENANCE

A 60x180-ft three-bay Armco Steelox building houses Central Ohio's maintenance facilities. Included in the building is equipment to permit all rebuilding and general maintenance to be handled on the property because of the isolated location. In addition to the conventional light hand tools, the shop has a 400-ton Rodgers hydraulic press, a lathe, four 400-amp Lincoln welding units and a 10-ton overhead crane.

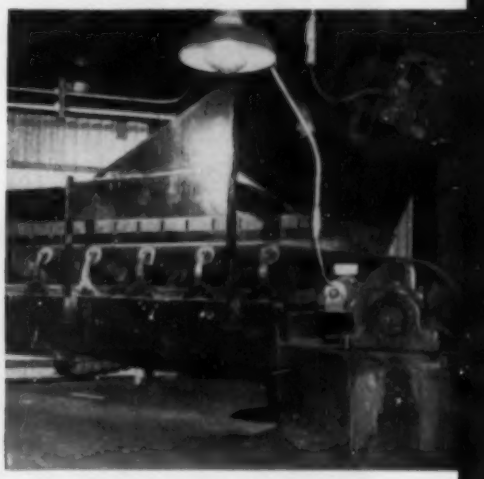
For handling supplies and heavy materials in and around the mine, Central Ohio maintains nine haulage units, as follows: an International LFD 410 tandem highway tractor unit, powered by a 300-hp NHRS Cummins diesel engine; a 40-ton trailer; a 31-ft flat Fruehauf tandem-axle unit; a Mack A40 flatbed unit with winch; two F3 Ford trucks; two Dodge Powerwagons; and a 2½-ton Dodge truck.

Parts and assorted supply items are stored systematically in a 50x100-ft covered area adjacent to the shop. The area has a concrete floor and one-third is totally enclosed with sheet metal to serve as a small-parts supply house. Large items, such as wire rope, power cables and heavy machine

STACKER BELT with adjustable boom builds up 9,000-ton stockpile which feeds 4½-mi overland belt.

CROSSING STREAMS AND HILLS is common as coal goes overland by belt.

SPANNING A RIVER to deliver 800 tph of coal to power plant is achieved with aid of 575-ft suspension bridge.



TYPICAL TRANSFER POINT along beltline has high skirt boards.

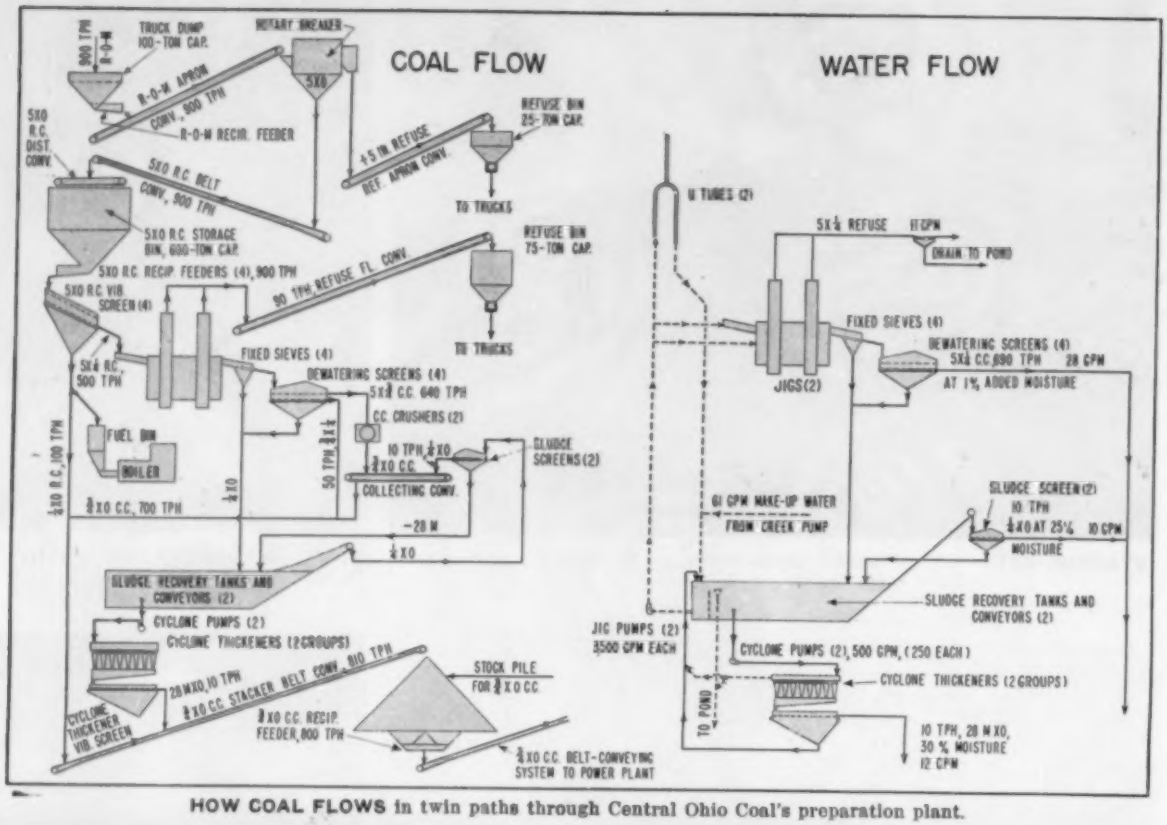
Mine to Consumer . . . Via 4½-Mi Belt

FOURTEEN SECTIONS of 36-in belt conveyor, owned and operated by the Ohio Power Co., provide a 4½-mi roller-coaster link between the preparation plant and the power plant on the Muskingum River. Near its terminal point, it spans the Muskingum River via a 575-ft suspension bridge 65 ft above the water.

Each of the sections is driven by an electric motor and total horsepower of motors in the system is 1,435. A 12,000-v power line parallels the belt system and individual transformers at each drive unit step voltage down to 550 for operation of belt drives. To protect electrical controls and motors, each transfer point is enclosed in a weatherproof house. To prevent coal from sticking, each transfer chute has a Syntron vibrator.

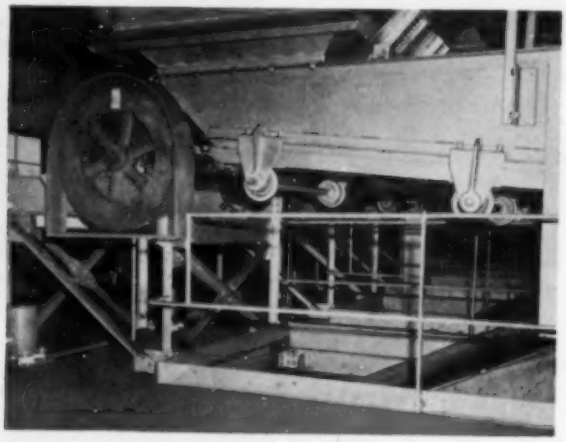
At the receiving point near the power plant, the coal is transferred to the plant's conveyor system, which can carry it either into the plant's overhead bunkers or transfer it to storage, as the need may be.

Design and construction of the conveyor system was under the supervision of American Gas & Electric Service Corp., New York, which is the engineering and service organization for the American Gas & Electric System. The B. F. Goodrich Co. and the Jeffrey Mfg. Co. were principal suppliers of materials for the conveyors and assisted with its engineering details. M. A. Hospador, Pottsville, Pa., was general contractor for the construction, and the American Bridge Div., U. S. Steel Corp., built the suspension bridge.


COAL FLOW
WATER FLOW
TRUCK DUMP 100-TON CAP.
800 TPH
ROTARY BREAKER
5X0
R-O-M APRON CONV., 800 TPH
R-O-M RECIR. FEEDER
5X0 R.C. DIST. CONV.
5X0 R.C. BELT CONV., 900 TPH
5X0 R.C. STORAGE BIN, 600-TON CAP.
5X0 R.C. RECIP FEEDERS (4), 900 TPH
5X0 R.C. VIB SCREEN (4)
FIXED SIEVES (4)
DEWATERING SCREENS (4)
5X¾ CC, 640 TPH
CC CRUSHERS (2)
FUEL BIN
BOILER
SLUDGE SCREENS (2)
COLLECTING CONV.
SLUDGE RECOVERY TANKS AND CONVEYORS (2)
CYCLONE PUMPS (2)
CYCLONE THICKENERS (2 GROUPS)
CYCLONE THICKENER VIB. SCREEN
STOCK PILE FOR ¾X0 CC
¾X0 CC, RECIP. FEEDER, 800 TPH
¾X0 CC, BELT-CONVEYING SYSTEM TO POWER PLANT
REFUSE BIN 25-TON CAP.
+5 IN REFUSE REF. APRON CONV.
TO TRUCKS
REFUSE BIN 75-TON CAP.
90 TPH REFUSE FL. CONV.
U TUBES (2)
5X¼ REFUSE 11 GPM
DRAIN TO POND
FIXED SIEVES (4)
JIGS (2)
DEWATERING SCREENS (4)
5X¼ CC, 690 TPH 28 GPM
AT 1% ADDED MOISTURE
SLUDGE SCREEN (2)
10 TPH ¼X0 AT 25% MOISTURE 10 GPM
61 GPM MAKE-UP WATER FROM CREEK PUMP
SLUDGE RECOVERY TANKS AND CONVEYORS (2)
JIG PUMPS (2) 3500 GPM EACH
CYCLONE PUMPS (2), 500 GPM, (250 EACH)
CYCLONE THICKENERS (2 GROUPS)
TO POND
10 TPH, 28 M X0, 30 % MOISTURE 12 GPM

HOW COAL FLOWS in twin paths through Central Ohio Coal's preparation plant.

DISTRIBUTING CONVEYOR receives breaker product from 48-in belt and apportions it to a 600-ton storage bin.



RECIPROCATING FEEDERS under bin start coal on its twin path through the 800-tph plant.

parts, are stored in the remaining area.

PIT DRAINAGE

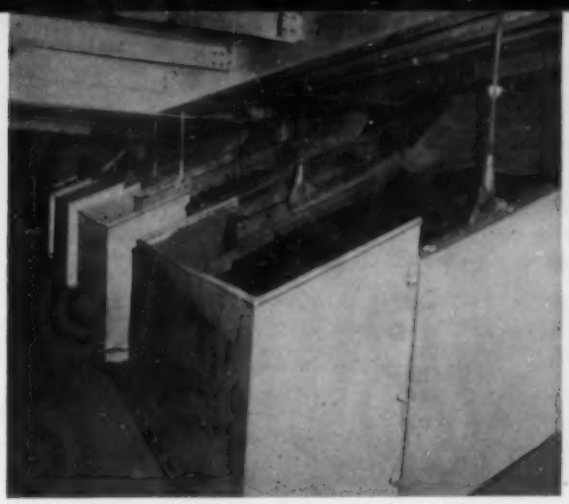
Four 4-in Gorman-Rupp portable centrifugal pumps, powered by 4-cylinder Hercules gasoline engines, are available for handling water in the pits when it cannot be removed by ditching. Single-braid fire hose is used for both the suction and discharge lines. Normal procedure is to remove as much water as possible by cutting ditches through the spoil whenever possible.

RADIO COMMUNICATION

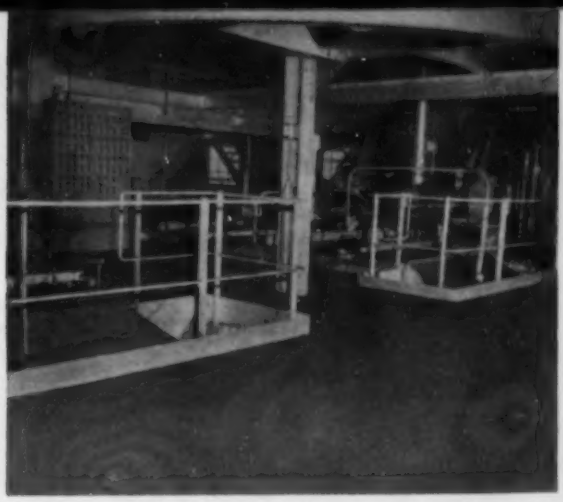
Radio units installed in the stripping units, mine superintendent's and mine foreman's pickup trucks, mine office and Zanesville central office permit easy, fast communication between personnel. Supervisors can concentrate their efforts where they are most needed and maintenance men can be dispatched to a piece of machinery in a matter of a few minutes. The 150-w General Electric unit operates on a frequency of 42.06 mc. Other Central Ohio mines also are equipped with the units.

PREPARING THE COAL

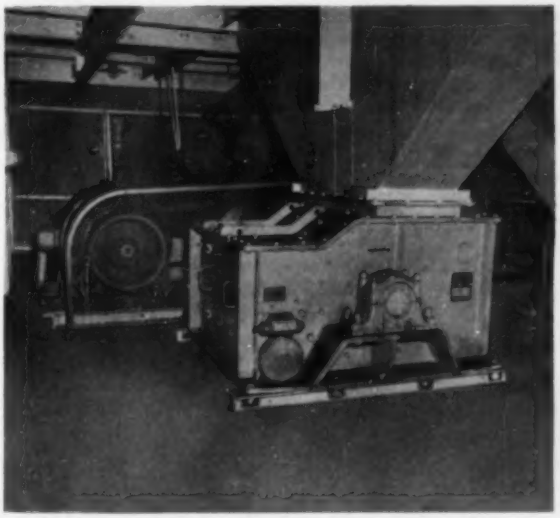
Coal is fed from the truck bin to an 83-ft 12x60 apron conveyor by a 6x8-ft reciprocating plate feeder ca-



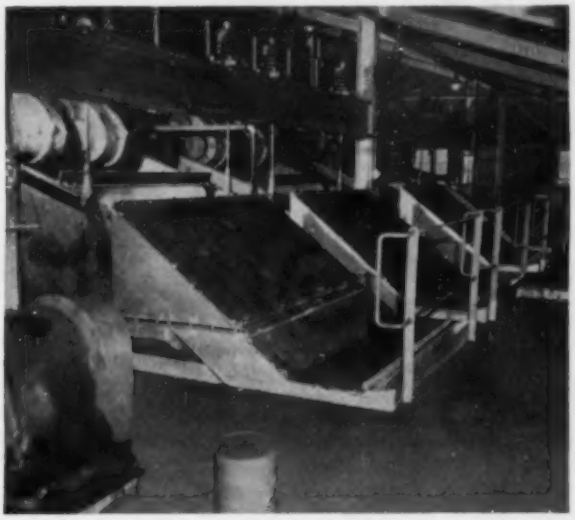
PRE-CLEANING SIZING is handled by a battery of four 6x16-ft vibrators which remove 5x5/16 for washing.



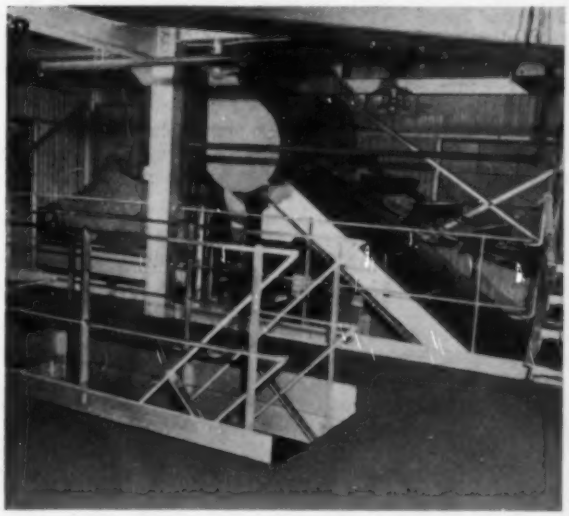
TWO JIGS receive equal feed from the pre-cleaning vibrators. Pushbutton panel (left) controls plant operation.



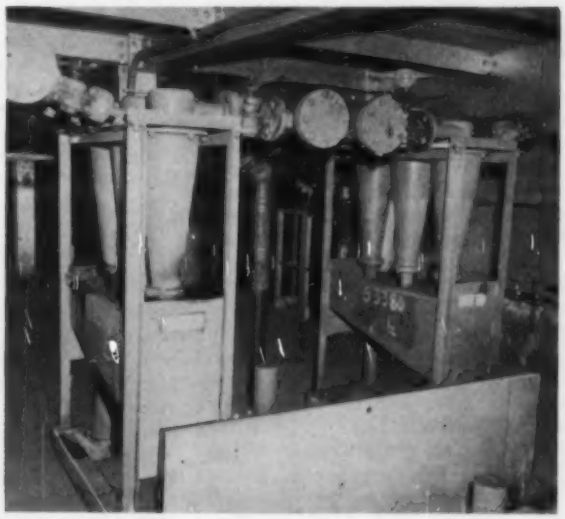
CRUSHER UNITS like this make final reduction of clean coal to 3/4x0 before it passes to stacker belt.



CLEAN-COAL dewatering and sizing into 5x¾ and ¾x5/16 is assigned to these four 6x16 vibrators.



DRAG CONVEYOR removes settled solids from sludge tank and carries it to dewatering vibrator.



CYCLONES, arranged in two 3-unit groups, recover fine solids and clarify water for recirculation.

pable of handling 900 tph of coal with lumps up to 36x48x60 in in size. The apron conveyor, powered by a 75-hp motor and traveling at 100 fpm, discharges into a 12x22-ft Pennsylvania Crusher Co. Bradford breaker driven by a 125-hp 720-rpm Westinghouse motor. Plus 5-in reject material is passed to a 54-ft 36x9 apron conveyor, powered by a 7½-hp motor, and delivered to a 50-ton refuse bin where it is removed by one of the two Euclid 22-ton dump trucks.

The 5x0 is elevated to the top of the washing plant by a 230-ft 48-in belt traveling 450 fpm and inclined at 18 deg. Conveyor idlers, including rubber impact idlers at the loading point, were supplied by the Jeffrey Mfg. Co. Belting is B. F. Goodrich 6-ply 42-oz duck with ⅛-in top layer, including breaker strip, and 1/16 bottom cover with a vulcanized splice. A 47-ft 6x48-in scraper conveyor powered by a 30-hp motor receives coal from the belt and spreads it across a 600-ton storage bin.

Four feeders, each at the bottom of an opening in the 600-ton bin, deliver 5x0 to four 6x16 Allis-Chalmers Ripl-Flo vibrators which separate it into 5x5/16 and 5/16x0 fractions. The 5/16x0 discharges onto the ¾x0 clean-coal stacker belt and the larger product discharges into two sluices which feed 400 tph each to two 84-in 4-cell 2-compartment Jeffrey Baum jigs.

Refuse discharges onto a 6x24-in 90-tph 87-ft scraper conveyor and is delivered to the 75-ton washer-refuse bin. Refuse is hauled to a refuse disposal area by one of the 22-ton dump trucks. Two undercut gates driven by a 5-hp Falk Motoreducer permit easy truck loading.

Clean coal is partially dewatered on four fixed sieve screens installed in the bottoms of the two drag conveyors carrying coal from the jigs to the dewatering screens. Each of the fixed screens has 25 sq ft of screen surface. Final dewatering and sizing into 5x¾ and ¾x5/16 is handled by four 6 x 16 double-deck Allis-Chalmers Low-Head vibrators. The dewatered 5x¾ discharges into two clean-coal crushers, each capable of reducing 325 tph to ¾x0. Crushers are Pennsylvania TK-6-32 units driven through V-belts by 200-hp, 900-rpm motors. Crushed products are directed to a 62-ft 6x48 clean-coal collecting conveyor which carries it to the 48-in stacker belt. The ¾x5/16 from the dewatering screens discharges directly onto the stacker belt.

Extending 313 ft upward at 20 deg, and equipped with an 80-ft boom, the stacker belt can build up a 9,000-ton stockpile of clean coal at the present time. The power plant's daily requirements can be pulled by gravity from the stockpile to the overland belt feeders. A Merrick weightometer installed on the stacker unit automatically weighs the coal as it passes to the stockpile.

Conveyor belting, supplied by B. F. Goodrich, is 6-ply 42-oz with ⅛-in top cover with breaker strip and 1/16-in bottom layer. The boom section has a pivoted-knuckle joint which is raised or lowered by a Shepard-Niles electric hoist. Power is supplied by a 100-hp 1,800-rpm motor and is transmitted to the belt through a direct-connected roller chain reducer.

FINES RECOVERED

Water with 5/16x0 degradation from the fixed sieves and dewatering screens flows to a pair of reinforced-concrete sludge tanks. Each has a pump tank at the rear which houses a 10x12 Allis-Chalmers Type CWE 3,500-gpm pump that recirculates water to the jigs. A pair of 6x72-in flight conveyors, powered by 25-hp gearmotors, travel 25 fpm while removing solids from the tanks and delivering them to a pair of 5x10 single-deck Allis-Chalmers Low-Head vibrators equipped with stainless-steel 28M screen cloth.

Plus 28M material is deposited on the ¾x0 clean-coal collecting conveyor and the underflow is sluiced back to the sludge tanks. The ¾x0 clean-coal collecting conveyor discharges to the ¾x0 stacker belt conveyor.

Two Hazleton Type CB centrifugal pumps deliver 250 gpm of slurry to six 8-in Heyl & Patterson cyclones from an intermediate point along the sludge-recovery tanks. The pumps are driven by 20-hp 1,800 rpm motors.

Underflow from the cyclone thickeners discharges to an Allis-Chalmers Aero-Vibe sludge vibrator equipped with a 28M screen cloth, while the overflow is directed back to the sludge tanks. The overproduct from the sludge vibrator is carried by chute to the clean coal and the underflow may be sent to a settling pond or returned to the sludge tank.

PLANT WATER SUPPLY

Fresh water is pumped either directly to the plant from Meigs Creek by a 4-in Hazleton Type VS 400-gpm pump driven by a 25-hp 1,800-rpm vertical motor, or to one of the four ponds adjacent to the plant.

The four ponds, with a combined storage capacity of 13,200,000 gal, are connected in series and receive water from wash-box overflow and the dewatering screens. Spray and makeup water is delivered to the plant by a 4-in Hazleton Type VS 400-gpm pump, located in the No. 3 settling pond.

Plant heating is provided by a Farrar & Trefts Bison steel heating boiler fired by an Iron Fireman No. 5 automatic 1,200-lb-hopper stoker and a group of 20 New York Blower unit heaters.

ELECTRICAL CONTROLS

Energy is delivered to the mine by The Ohio Power Co. at 66,000 v and is stepped down to 4,380 v for the stripping units and to 12,000 v for the preparation plant and overland beltline by 3,000-kva Westinghouse and 2,000-kva General Electric transformer units. The 3,000-kva transformer handles the cleaning plant and the beltline to the power plant and the 2,000-kva unit serves the strip mine.

The 12,000-v preparation-plant circuit is further reduced to 440 v to operate the 68 Westinghouse motors which have a combined horsepower of 1,520½. Starters for all motors except those on the unit heaters are mounted in two Westinghouse control centers. Combination circuit-breaker linestarters are used for all motors 50 hp and smaller. For all over 50 hp, combination circuit-breaker reduced-voltage starters are used.

One control center is housed in the breaker building and contains starters for all motors in the R-O-M system except the 5x0 raw-coal and distributing conveyors. The second center for the remainder is housed in the washing plant. Both centers are dust-tight and all motors are interlocked and provided with sequence starting.

A 4-wire system with separate neutral from the substation to all equipment provides maximum protection against grounding. Power cables are American Steel & Wire 1/0 and 4/0 shielded units. Westinghouse switchhouse loadcenters provide protection for stripping and loading equipment.

QUALITY CONTROL

To provide a check on plant performance, a system of daily sampling and analysis is carried out under the direction of Leo C. Wint, preparation engineer. Hourly samples are taken from the discharge end of the stacker belt by a semiautomatic sampler that cuts the stream twice and collects 100 lb. of coal. In addition to the clean-coal samples, regular channel samples are taken in the pit.

All samples are analyzed for ash, moisture and Btu, and results serve as a guide for plant operation. A composite sample analysis also is made and sink-and-float tests are run to determine jig efficiency.

LIGHTWEIGHT HANDTOOL drives spads into roof coal in a matter of seconds.

TYPICAL SCENE at Montour 4 shows all cables, compressed-air and water lines hung neatly along ribs and close to the roof.

Spad Hangers Save Time

PREVENTING DAMAGE to trailing cables, water and compressed-air lines is always a problem around mobile off-track mining equipment. By supporting them with special hooks suspended from spads driven into the roof or rib by a hand-operated tool, they are kept well out of the way of equipment at Pittsburgh Coal's Montour 4.

Soon after roof-bolting was started at Montour 4 in 1953, mine management realized that trailing cables and the like could not be hung as easily as when plenty of crossbars and straight posts were set. Wire had to be twisted around roof-bolt plates and then the cable or pipe line had to be fastened to it and sometimes bolts were not installed where cables needed support. As a result, holes sometimes were drilled by the bolting crew to provide places where supports could be installed. Supporting cables and pipe lines from bolts was not completely satisfactory because bolts were installed 4 ft from the rib and thus cables were still subject to accidental damage.

Each of the sections at Montour 4 is supplied with a Spad Driver, case-hardened spads and hooks. A utility man on the section crew is assigned to drive spads into the roof coal or ribs where cables and other lines are to be supported. Spads usually are set on approximately 4-ft centers and hooks are suspended from each. The hooks are readily removed for later use as the mine advances or retreats. The 5-lb gun, spads and hooks were supplied by the American Mine Supply Co.

Spads are installed along left and right ribs and trailing cables are hung along one side while water lines and Airdox tubing are suspended along the other.

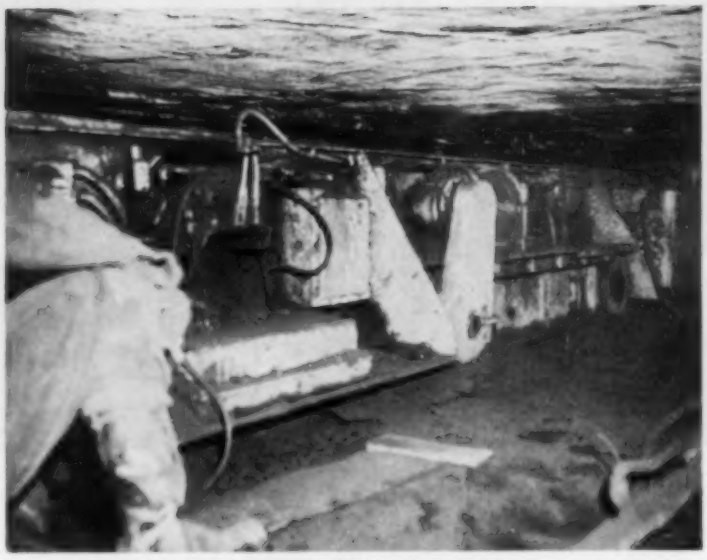
The Spad Driver also comes in mighty handy when curtains are to be installed or advanced. One man can complete the installation in much less time than was formerly needed. Spads are driven into the roof on 2- to 3-ft centers and then the brattice cloth is hung by folding a double thickness against the spad and inserting a wire nail through the cloth and eye of the spad. When the curtain is to be removed, a worker starts at one end and removes nails and rolls up the cloth for future use. Advantages of using the spad gun and spads for hanging brattice cloth are faster, easier installation and recovery of the cloth for future use.

EXTENDING LINE BRATTICE is easy. Spads provide support points.

SPECIAL hardened spad and all-purpose hanger are used in rib or roof.

BLOWDOWN VALVE in compressed-air line is hung in breakthrough.

New portable extensible belt conveyor provides direct link between continuous-mining machine and butt-entry conveyor in advances up to 600 ft long. Best shift record is 80-ft advance, 16 ft wide, in 42-in seam with 3-man crew.

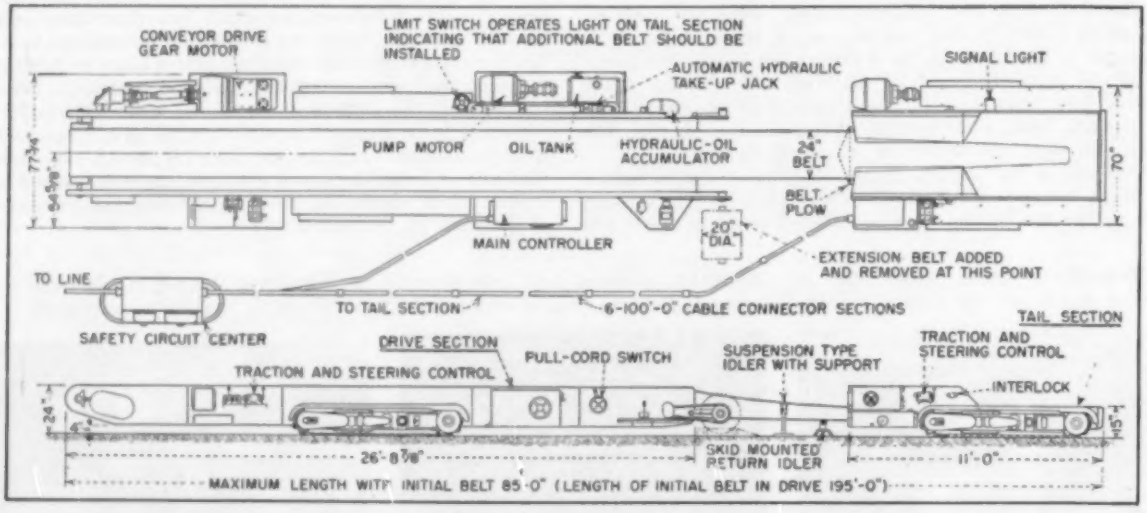


SELF-PROPELLED DRIVE SECTION of portable extensible conveyor stores and pays out additional belt to follow advancing mining machine.

Continuous Intermediate Haulage

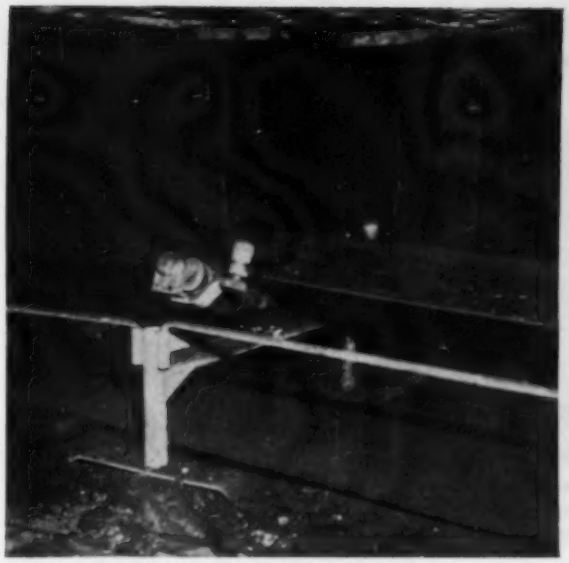
By HAROLD DAVIS
Associate Editor, COAL AGE

MORE-CONTINUOUS HAULAGE behind continuous miners and bright prospects for laying out lower-cost mine projections are two results of recent experiments with a portable extensible belt conveyor at Kent 2-A mine, Rochester & Pittsburgh Coal Co., McIntyre, Pa. The new conveying unit, a product of the Joy Mfg. Co., has proven effective in following up an operating continuous miner in straightaway advances up to 600 ft long, taking coal directly from the discharge boom of the miner and conveying it to the butt-entry belt with-

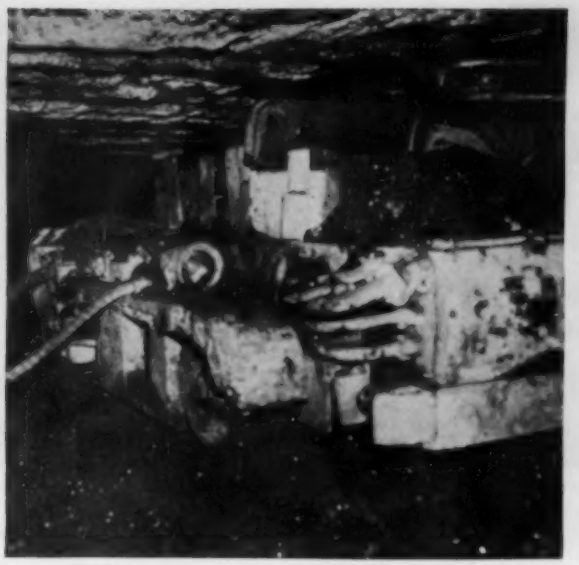


Portable Extensible Belt Conveyor Improves Transportation

THE NEW UNIT, latest step in the progress toward providing continuous transportation for continuous mining, also may result in changes in mine projections that will lead to increased overall efficiency. Two men require only about 10 min to add 100 ft of additional belt at the drive section to permit a 50-ft advance of the tail section as it follows the mining machine. A 66-ft-long opening is required for the original set-up of both conveyor and miner. Minor misalignment may be corrected by manipulation of tail steering controls.



BELT-CONVEYOR SUPPORT is provided by pivoted flexible troughing idlers and flat idlers under the belt.



SELF-PROPELLED TAIL SECTION receives coal from continuous-mining machine or from feeder car.

out undue interruption or rehandling.

A worthwhile possibility, now being investigated by R&P's production and engineering departments, is that of using the extensible belt in long rooms, 600 ft long or longer, with the object of doubling the center-distance between butt entries, thus providing twice as much room coal for each increment of development.

Operations at Kent 2-A are in the 42-in Upper Freeport (E) seam. The mine has been developed from the start with continuous miners and now employs four continuous-mining units and one conventional unit. The continuous-mining unit which is served by the extensible belt requires only a 3-man face crew, while the other three units each require one additional man, an operator for the pickup loader.

The best record so far rung up by the 3-man crew is an advance of 80 ft in a 16-ft-wide working place in a single shift. The average advance is about 60 ft per shift.

HOW THE EXTENSIBLE CONVEYOR OPERATES

As shown in the accompanying illustration, the portable extensible belt is made up of a drive section 26 ft 8⅞ in long and a tail section 11 ft long, both self-propelled. Length of opening required for initial setup is 66 ft, enough to accommodate the two sections of the conveyor and the continuous miner.

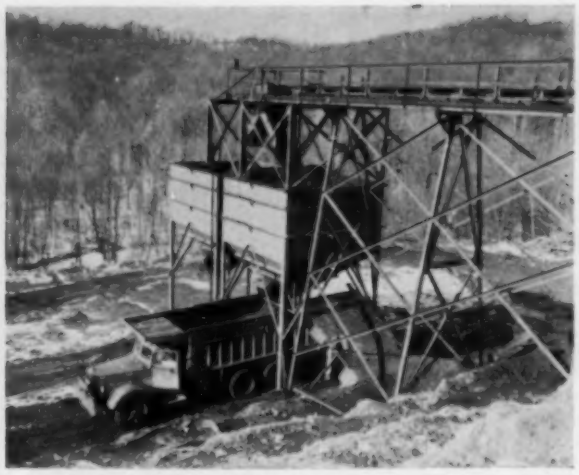
In this starting position, the extensible conveyor carries 195 ft of belt, about half of which is wrapped around pulleys in the take-up cluster in the body of the drive section. Then as the continuous miner advances into the seam, the operator of the extensible belt, stationed at the tail-section controls, trams the tail section forward to keep it under the boom of the miner. As the tail section follows the miner, the take-up cluster in the head section contracts against the pressure exerted by a hydraulic jack, thus releasing additional belt as the tail section moves away.

Flexible troughing idlers on specially designed supports are installed under the top run of the belt at 5-ft intervals, and straight idlers mounted on skids are placed under the return

How the New Conveyor Is Used at Kent 2-A

EXTENSIBLE BELT in the right heading of right-parallel entry served as direct transportation when right heading was worked and as panel belt when other three headings were advanced. One idea for possible future application is to use the conveyor in 600-ft-long rooms, thus doubling butt-entry center distance.

TRANSPORTATION-CAR OPERATOR controls speed of the bottom conveyor of feeder car through pullcord which he can reach from his cab to permit rapid unloading.



MAIN-ENTRY BELT, transporting production from four continuous-mining units and a conventional unit, discharges into either of two 40-ton bins for truck haulage to plant.

run. A belt plow attached to the frame of the tail section cleans material from the top of the return run before the belt reaches the return pulley.

Additional belt sections are added in 100-ft lengths to permit 50-ft advances. An automatic reminder that another section of belt is needed is flashed from the drive section through a limit switch on the take-up cluster to a signal light on the tail section. Two men can add or take off a section of belt in 10 min.

The 100-ft sections are stored on specially-designed reels which are installed in a pair of carrier arms at the rear of the drive unit to feed belt into the take-up cluster. Retrieving the belt sections is a powered operation. A small motor at the rear of the drive-section frame drives the belt-storage reels through a chain and sprocket. The company has enough belt sections to permit 600-ft advances with the unit.

HOW THE COAL IS MINED AT KENT 2-A

Present mining projections at Kent 2-A include a 4-heading main entry with 4-heading parallels on both sides of the mains. Butt entries are turned from both sides of the mains on 670-ft. centers, as shown in the diagram of mine workings, and rooms are driven both ways at right angles to the butts. The main entry is protected by 150-ft-wide pillars between the mains and the parallels on both sides. A 20-ft-wide pillar is left to serve as an air barrier between the ends of rooms driven from adjacent butts.

All openings in the continuous-mining sections are 16 ft wide with development openings on 50-ft centers and rooms on 25-ft centers.

At the time the mine was visited, the extensible belt was being used in advancing the right parallel entry inby from 3-Right Butt. The extensible belt was installed in the right heading, looking inby.

While this particular heading is advanced, the tail section of the conveyor is trammed ahead to permit direct loading from the continuous miner, but while any one of the other three headings is advanced the belt is fed from a Joy 6-SC shuttle car which discharges at full rate to a specially-designed feeder car, which in turn discharges at a measured rate onto the belt.

The feeder car—each mining unit has one—is a Jeffrey shuttle car with a two-speed, hydraulically-driven bottom conveyor. The high speed is used while the transportation car is discharging, then the unit is returned to low-speed operation to feed the coal onto the belt at a rate that prevents spillage. The transportation car discharges in 35 sec.

The speed of the feeder-car conveyor is regulated by the operator of the transportation car through a pull-cord which he can reach from his seat and which is connected to the speed controller in the cab of the feeder car. Other controls on the feeder car include a bar across the discharge boom to form a throat of constant dimensions and a centrifugal switch on the belt to interrupt power to the car if the belt should stop.

The extensible belt operates at 320 fpm but the butt-entry belt travels faster, 330 fpm, to string out the load as a step in regulating the load on the main-entry belt which also receives coal from two other belts. The extensible belt is 24 in wide and all others are 30 in wide.

The main-entry belt conveyor now is 2,600 ft long. All splices, except one, are vulcanized, the mechanical splice permitting periodic correction of belt stretch. Belt-conveyor drives include a 100-hp motor on the main unit and 50-hp drives on all others.

The four continuous miners are Joy 3JCM's and the transportation cars for all units are Joy 6-SC's. The 3-man crew of the unit equipped with the extensible belt includes a continuous-miner operator and a helper and the tail-section operator for the extensible belt, who also operates the shuttle car when it is used. One supervisor oversees the operations of two continuous-mining units and one-third of a mechanic's time is charged against each.

The mine operates three shifts per day with a total employment of 113 men. Production averages about 1,900 tpd, clean coal, (2,300 tpd, raw) and productivity averages 12.5 tons per man-shift, raw coal, after prorating for cleaning-plant labor with two other mines using the same plant. The coal is hauled 2½ mi from the mine to the plant in trucks which are loaded at either of two 40-ton bins into which the main belt conveyor discharges.

Ventilation for the continuous-miner faces is supplied by a 4-ft Jeffrey Aerodyne fan which provides from 8,000 to 10,000 cfm over each machine. The mine now operates on three separate splits of air, 2-Right, 3-Right and 3-Left. In handling mine

water, LaBour pumps are discharging to the surface about 60 gpm through a 4-in discharge line, although some of the mine water is used as spray water by the continuous miners, about 7½ gpm, when all machines are operating.

Power is supplied at 550 v, DC, by a 500-kw rotary converter on the surface through three 500-MCM feeders installed in a separate heading of the main entry. The return, also three 500-MCM lines, is supported on the frame of the main-entry conveyor. Butt-entry lines are single 4/0 positives and two 1/0 negatives. Disconnect switches are installed at 2,000-ft intervals in the main feeder lines. The main breaker at the converter provides further protection and all units are connected to the power system through conventional protective devices.

Supplies are hauled from the surface to the butt entries in trailers by a Baker-Fletcher mine tractor.

PROSPECTS FOR IMPROVED MINING PROJECTIONS

Having proved to their own satisfaction the effectiveness of the extensible conveyor in providing better transportation for continuous miners for distances up to 600 ft, R&P management now is engaged in planning new applications of the unit to achieve even higher efficiency.

Using the new unit in rooms, it may be possible to increase room length from the present 325 ft to 600 ft, thus increasing butt-entry center-distance from the present 670 ft to 1,220 ft. The advantages would be a 50% reduction in development work as well as the elimination of half the number of butt-entry belts.

Another possibility is driving 31-ft-wide rooms on 50-ft centers, rather than the present 16-ft rooms on 25-ft centers. This change would align each room neck with a heading crosscut to provide access to the butt belt, and a bridging unit could be used between the continuous-miner discharge and the tail section of the extensible belt in permitting the miner to work two parallel lifts in the wider rooms.

Still another idea is the use of the extensible belt in developing main or butt entries to shorten the haulage distance from the side headings to the belt-conveyor system. The use of the extensible unit in tandem with the main belt in this manner also would permit longer advances of the belt heading and consequentiy the installation of longer sections of main belt at one time.

READY TO OPERATE—Monorail extention reaches to the center of car.

OUT OF THE WAY—extension swings back, is locked in place.

Pivoted Support Extends Monorail For Handling Heavy Equipment

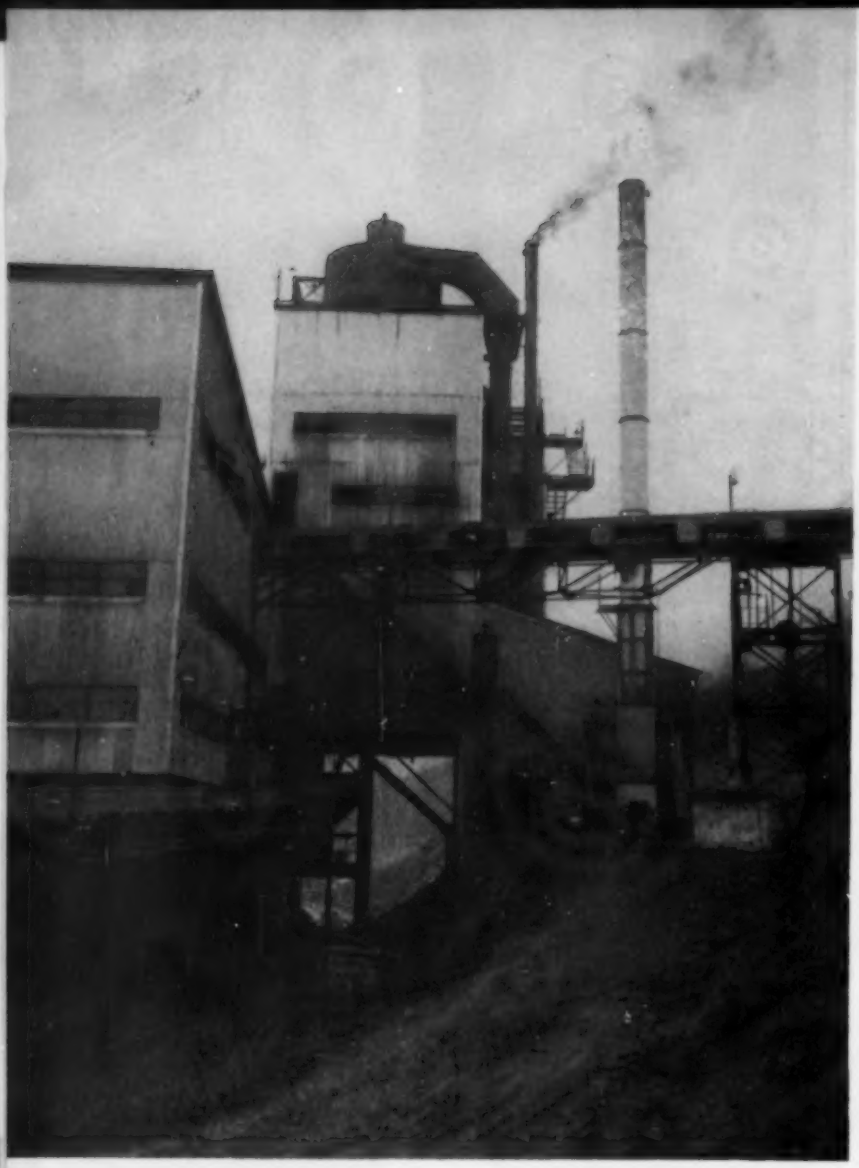
HEAVY MAINTENANCE UNITS such as armatures, motors, etc., are handled in and out of mine cars easier, quicker and safer at the shop of the Boone County Coal Corp., Sharples, W. Va., since the shop monorail was extended to the supply track and a movable extension added to reach out over the center of the car.

A steel post supporting the end of the monorail track acts as the kingpin from which the extension pivots to the operating and fold-back positions. The post is offset 2 ft from the monorail to provide the necessary clearance for parts handled with the trolley and chain hoist.

Thrust and side pull are carried on ball bearings so that it is easy to swing the extension into position. Spring pins lock the extension in the active and fold-back positions.

"STOP" Signs at Room Necks Warn Peabody Miners

A NEW SAFETY DEVICE, now in use at Mine No. 8, Peabody Coal Co., Tovey, Ill., warns other men in the area that blasting operations are being carried on at the face. The warning signal, made at the mine shop, consists of a large red-glass reflector mounted on a steel plate which is supported on metal-pipe legs. The unit is set up at the entrance to a room where shooting is in progress to reflect the light from the cap lamps of approaching men, thus warning them to stay out of that room until the shooters remove the signal.



New fine-coal plant at Red Jacket No. 17 also upgrades fines from two other company mines. Experience-tested design includes pre-drying to insure uniform results from air tables. Installation minimizes investment in foreign-coal dumping equipment.

NEW 80-TPH CARBON PLANT (right) adjoining the main plant, seen from downtrack, centralizes upgrading of ¼x0 from three Red Jacket mines.

Carbon Cleaning Centralized

CARBON DRYING and cleaning for three of the seven mines of the Red Jacket Coal Corp. have been centralized by installation of the second phase of the coal-preparation improvement program at No. 17 mine, Red Jacket, W. Va. In planning the new carbon plant, rated at 80 tph, the company's investment in "foreign-coal" handling equipment was held down by an arrangement using the railroad ca as the storage bin.

In 1952, No. 17 mine was equipped with a complete new 350-tph Roberts & Schaefer plant with a Link-Belt 2-compartment 6-cell Baum jig for washing the 5x¼-in coal (*Coal Age*, February, 1953, p. 88). Excavation for the plant included an area next to the hill for the projected facility.

Mitchell Branch and Junior mines —the other two company operations in the vicinity of Red Jacket—are by rail 3.4 and 1.1 mi, respectively, from the No. 17 plant. Neither has facilities for drying and cleaning carbon. Now, with completion of the new facilities at No. 17, the carbon from both mines is dried and cleaned "in-transit."

All-around satisfaction with a 40-tph Roberts & Schaefer carbon drying-and-cleaning plant installed in 1951 at the company's No. 12 mine at Coal Mountain, Wyoming County, W. Va. (*Coal Age*, June, 1952, p. 82), was a factor in selecting the same type of equipment for No. 17 mine.

This newest plant consists of a Raymond flash drier and two Roberts & Schaefer Super-Airflow tables. The drier column, which is 36 in in diameter, not only dries but also acts as an elevator to raise the coal to the level of the table surge hoppers. The tables make four products: clean coal, middlings, refuse and dust, with the latter caught in a cyclone collector. The middlings product moves over an Allis-Chalmers Aero-Vibe screen from which the minus 10M is discharged as final refuse and the plus 10M is recirculated to the table.

The drier furnace is fired with pulverized fuel and the controls are automatic. Coal supply to the pulverizer is principally the dust collected by the table cyclone. Consistent results from the air-table treatment are as-

sured by this drying of the table feed.

Plant results, briefly, include: reduction of the ash in the carbon by 5 to 7%; and reduction of total moisture content from a maximum of 10 to 3%.

To move the raw carbon from the main plant to the new structure, a scraper conveyor was installed. It discharges to a screw conveyor, the coal moving in turn through a chute to a second screw feeding the drying column.

Foreign coal, that is, the carbon arriving by rail from Mitchell Branch and Junior mines, is carried from the car-dumping point to the plant on a 24-in belt conveyor operating on 385-ft centers. Barber-Greene furnished the structure for the conveyor.

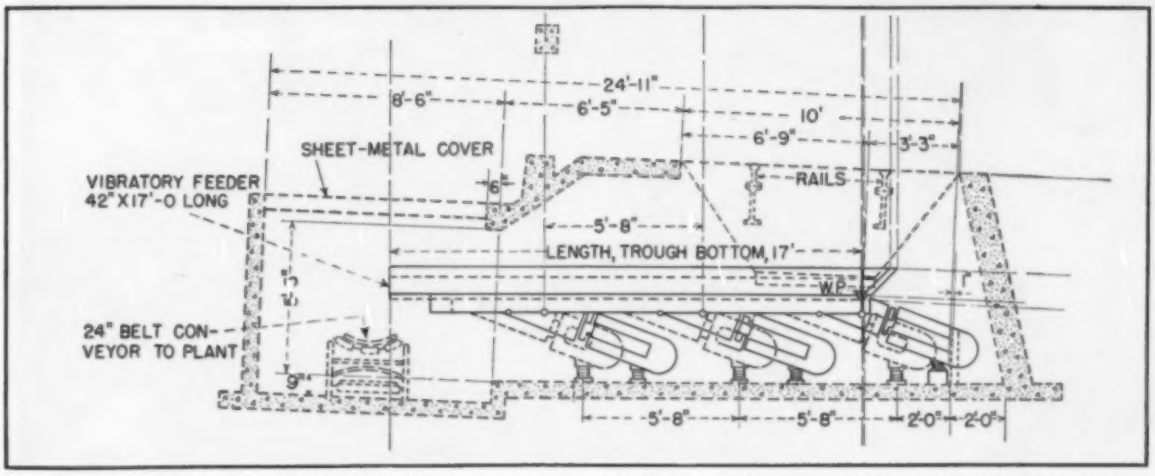
Using the railroad car as a storage bin, an arrangement which required a pit only 7½ ft deep below the level of the rails, was made practical by installing a car shaker and a vibratory feeder. The shaker is a motor-driven unit made by Allis-Chalmers. The magnetic-type feeder, a Syntron Model 3FFF55, is 42 in wide by 17 ft long. Its drive consists of three electromagnets with frequency control remotely adjusted from the carbon plant to any desired rate of feed.

The main plant at No. 17 mine runs two shifts and the carbon plant three. Feed to the carbon plant consists of ¼x0 from No. 17 mine during the two shifts that plant operates. On the third shift the carbon plant upgrades the ¼x0 foreign coal received from the other two operations.

Management of the seven mines operated by the Red Jacket Coal Corp. is concentrated at Red Jacket under direction of Wm. M. Ritter, president and general manager. The general sales office of the company is at Columbus, Ohio. In 1953, the company produced 3,570,000 tons.

CAR SHAKER for dumping incoming coal. Low-level conveyor gallery leads up to the new carbon plant, the high structure on the right side of the plant.

COMPLETED NO. 17 PLANT seen from up-track. The new facilities for drying and air-cleaning carbon are in the taller structure at the left.



SHALLOW HOPPER, vibratory feeder and belt conveyor for handling the "foreign coal" brought in by rail from two other mines. Using rail car for storage cut investment in equipment.

WALKING-TYPE 5-YD DRAGLINE uncovers 5,000 tons of Buck Mountain-vein coal in 12 shifts. Most of the spoil is stacked as backfill in the pit, leaving only enough room for construction of a haulage ramp by the loading dragline.

Stripping and Loading Coal

In stripping smaller anthracite basins, some of which were discovered through close study of aerial photos, John E. Schumacher & Son employ cut-and-backfill methods designed to limit excessive hoisting.

AERIAL PHOTO, taken in March, 1953, shows area of Schumacher operations at an original scale of 1 in equals 1,600 ft. Using photos like this one, Schumacher officials are better able to discover worthwhile deposits.

VIEW FROM THE PIT shows the dragline excavating against the solid highwall with spoil piles in the foreground indicating the minimum swing required.

With Dragline Units

HERE IS AN ANTHRACITE strip-mine operator who keeps his men and equipment busy by finding and working worthwhile coal deposits in previously-stripped areas. Right now, John E. Schumacher & Son, Pottsville, Pa., headed by John E. Schumacher Sr., general manager, is stripping a basin in the Buck Mountain vein and has several reserve sites in the Lykens Nos. 4 and 5 veins near Hegins, Pa., all of which were spotted through close study of aerial photos.

CRAWLER-MOUNTED 2-YD DRAGLINE loads coal on opposite side of basin after broken overburden has been removed by the larger machine.

The company first resorted to prospecting with the aid of aerial photos about 4 yr ago, when a set of U. S. Department of Agriculture prints proved to be of value in tracing the outcrop of the Pottsville Conglomerate, the stratum underlying the coal measures. Furthermore, the interrelationships of older strippings, as shown in the photos, sometimes indicated the presence of workable coal, and in several instances, subsequent exploration on the ground proved the existence of such coal.

In 1953 the company undertook a survey of its own, done by Capitol Aerial Surveys, New Cumberland, Pa. The area covered by the survey centers north of Tremont in the southern field. The use of aerial photos to eliminate much of the time-consuming legwork involved in prospecting on the ground is the idea of John E. Schumacher Jr., general superintendent, who has had several years' experience in oil explorations in the West, where aerial photos are an indispensable tool of the job.

Present operations, shown in the accompanying photos, are in the Buck Mountain vein where the removal of overburden was begun at the extreme spoon end of a basin. At the beginning of the project the overburden consisted of about 35 ft of wash and loose material that required no blasting. As the work progressed along the axis of the basin the overburden became thicker and harder, but this complication was offset by the fact that the coal also became thicker. Now with the pit fully opened, the overburden along the axis of the basin levels off at about 70 ft in thickness. The coal in the 160-ft-wide basin is about 35 ft thick, thinning out to 8 to 10 ft at the outcrops. The over-all stripping ratio is about 3½ to 1.

The coal is cleaned in a plant equipped with four Wilmot Type A jigs for cleaning the coarser sizes and three Deister SuperDuty Diagonal-Deck tables for the finer sizes.

DRAGLINES HANDLE STRIPPING AND LOADING

Stripping methods at the Schumacher operations are designed to permit recovery of the coal with the least possible hoisting of overburden out of the pit. The cut-and-backfill system is made possible through the use of a dragline in the pit, working from the top of the spoil in loading out the coal exposed at the bottom of the basin.

Major stripping units are a Page

RAW COAL is dumped directly into cleaning plant hopper or stockpiled for later recovery by 2-yd dragline.

DESILTING TANK permits removal of minus 3/32-in fines from wash water for stockpiling and future cleaning.

ENTIRE OUTPUT of the cleaning plant, about 400 tpd in two shifts, is shipped in trucks.

90-KW DIESEL-ELECTRIC SET produces power for operating and lighting the cleaning plant and its auxiliaries.

ELECTRIC-POWERED churn drill prepares overburden for two 5-yd units.

SUPERVISORS: Louis Miller (left), foreman; J. E. Schumacher Jr., supt.

621 walking dragline with a 5-yd bucket and a 135-ft boom and a Bucyrus-Monaghan 5-W walking dragline with a 5-yd bucket and a 100-ft boom. The loading unit is a P&H 955 equipped with a 2½-yd bucket on a 90-ft boom.

Auxiliary machines include two 2-yd Bucyrus-Erie 43-B draglines, one of which recovers shallow coal exposed by the 5-W along the outcrop on one side of the basin while the Page 621 operates from the opposite cropline in removing the remainder of the overburden. The other 43-B is permanently stationed at the cleaning plant to place raw coal in the plant-feed hopper from a nearby storage pile in the event that delays in the pit interrupt delivery of coal to the plant.

All material removed by the 5-W

is cast outside the pit. Most of the material removed by the Page is stacked in the worked-out portion of the pit. Only about 25% of the total overburden must be hoisted out of the pit, including that removed by both the 5-W and the 621.

One other unit, a ¾-yd Bucyrus-Erie 19-B, is used in loading small amounts of coal which are sometimes stockpiled outside the pit by the stripping units in the course of their work.

BREAKING AND REMOVING HARD OVERBURDEN

Overburden is removed in 55-ft cuts, measured along the basin axis. Two rows of blastholes are required to break up a cut, the front row 30 ft back from the toe of the highwall and the back row 20 ft from the front row. The holes in each row are 18 ft apart. About 5,000 tons of coal is uncovered by the removal of each 55-ft cut.

Drilling is done by a Bucyrus-Erie 42-T churn drill which is powered by a 60-kw Murphy diesel-electric set transported on a separate rubber-tired trailer. A similar diesel-electric set provides power for pumping.

Two men operate the drill in preparing the overburden for both 5-yd draglines, each working its own section of the basin. About 12 shifts with a 5-yd unit are required to uncover a cut of coal at the present time. Then two more shifts are required by the P&H 955 to prepare a loading ramp and make a final cleanup before beginning to load. The 955 loads only the coal uncovered by the Page. The 5-W strips an area which was previously deep mined, and the 43-B loads the pillar coal.

In the deepest blastholes, 70 ft maximum, the bottom one-quarter of the charge consists of 40% gelatin and the remainder of the charge is a slower explosive. The top 35 ft is stemmed. The charge is detonated through Primacord with millesecond delays between rows.

Approximately one-third of the material is rolled out into the void which is left after the preceding cut of coal has been loaded out. Most of the remaining spoil is stacked in the worked-out portion of the pit, leaving only room enough for the loading dragline to build its own ramp to the newly-exposed cut.

The coal-haulage fleet includes three 10-ton Ford F-8 and two 10-ton Dodge T-Model trucks, all with Baumis conversions to provide 6-wheel suspension, and one 11-cu yd Euclid FD. Three International TD-18 bulldozers serve the stripping units and construct necessary haulage roads.

CLEANING THE COAL

The two Lykens veins underlie the Buck Mountain vein at considerable depth in the basin. These reserves will be mined at a later date by stripping down to the economic limit followed by deep mining. The deep mining is to be let out on contract, although the coal will be cleaned to standard specifications in the company's plant, known as Kemble colliery, the name used by the former owners. One such deep mine recently was placed in operation.

Buck-Mountain-vein coal is harder in structure than Lykens-vein coals, although it is somewhat higher in inherent-ash content, averaging from 8 to 10% inherent ash. Clean-coal recovery from the plant feed from this vein is about 52%, and 40% of this is stove and nut coal.

Coal from the Lykens No. 5 vein is somewhat friable, averages from 6 to 7% inherent ash and has excellent burning characteristics because of its relatively-high volatile content. Clean-coal recovery from the feed is about 75%, with 20% of this in the prepared sizes.

The Lykens No. 4 vein provides a premium product containing only about 2% inherent ash. Clean-coal recovery is about 90% of the feed since only 2 in of the 44-in vein is rejected. About 55% of the product is in the stove and nut size range.

Raw coal is fed into the plant hopper either directly from the haulage trucks or by the 2-cu yd dragline from the stockpile at the plant. Plus 3¼ in material is scalped to permit hand picking, then crushed to minus 3¼ in since egg coal now is the largest size being prepared. Minus 9/16-in material also is separated at the primary screen and chuted to presizing screens which split this portion of the raw coal into a 9/16 x 5/16-in fraction for the buckwheat table; a 5/16 x 3/16-in fraction for the rice table, and a 3/16 x 3/32-in fraction for the barley table. The underflow of these screens, containing Nos. 4 and 5 raw coal, is sluiced to a desilting tank where the solids are recovered and stockpiled for future cleaning.

The plus 9/16-in material from the primary-sizing shaker and the product of the crusher are presized at a second screening site to provide four splits to feed the four jigs. These are 3¼ x 2 7/16-in egg; 2 7/16 x 1 5/8-in stove; 1 5/8 x 13/16-in nut, and 13/16 x 9/16-in pea. Underflow of these screens joins the feed to the fine-coal presizing shakers.

The products of the cleaning units are chuted into separate storage pockets having an aggregate capacity of about 500 tons. All coal is shipped by truck since rail facilities are not available to the plant.

Electric power for operating and lighting the plant is generated on the property by a 90-kw Murphy diesel-electric set installed in a separate building.

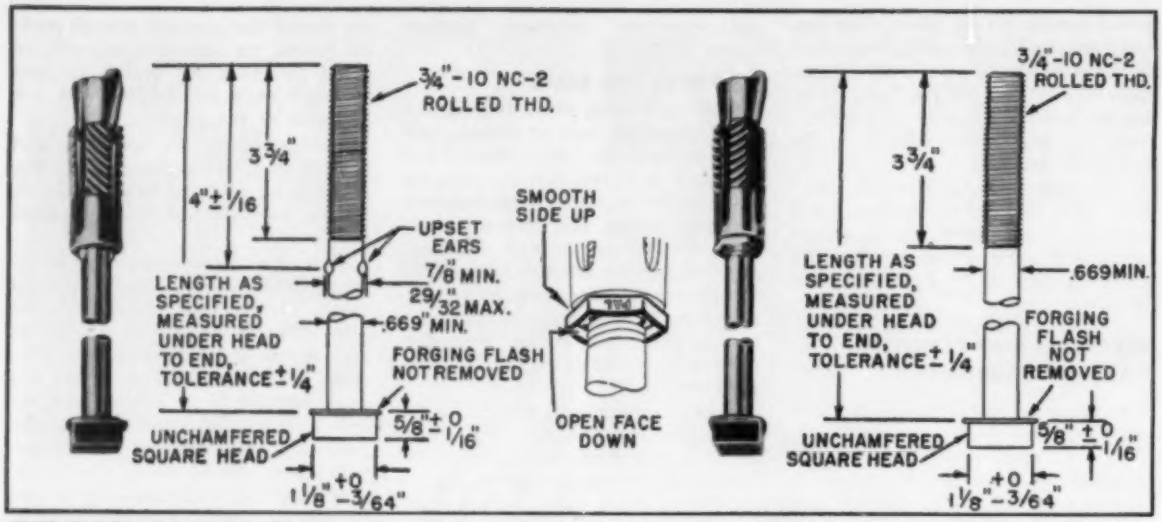
Water for the cleaning units is obtained from a nearby abandoned deep mine. Normally the water flows by gravity out of the drift mouth, but in dry seasons it becomes necessary to pump from the inside pool into the water-level drift to achieve the required flow. The water leaving the mine is impounded in a small reservoir on a hillside above the plant, thus providing an opportunity to test its pH and afford a liming basin if neutralization is indicated.

Reject water from the plant also may be clarified and recirculated when the supply at the primary source in the deep mine is reduced. Effluent from the cleaning units, carrying the underflow of the fine-coal presizing shakers, is directed to a desilting tank, as mentioned. Settled solids are removed from the bottom of the tank by a drag conveyor for stockpiling, and the overflow of the tank is carried in a flume to a settling pond lower down on the hillside. The clarified overflow of the settling pond then may be returned to the plant by a 4-stage Barrett-Haentjens pump which delivers 375 gpm against a 375-ft head. The plant requires about 800 gpm, the remainder being made up from the primary source.

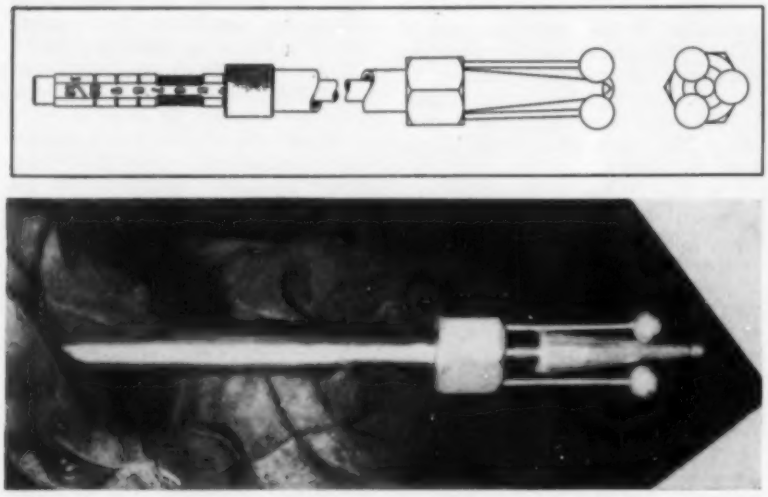
Production from the property at its present stage of development is about 400 tpd, clean coal, in 2-shift operation. The working force includes 22 men in stripping, 16 men in the cleaning plant and 6 men at the company's shop.

The work on this job began in November, 1951, and reserves of both strip and deep coal combined are expected to last at least another 10 yr. Every effort has been made to stabilize working time for the company's employees in order to preserve a well-trained nucleus of equipment operators. This has been done by rotating the six operators among the several units at the pit, thus providing ample time for maintaining the idle units as well as providing regular employment for the working force.

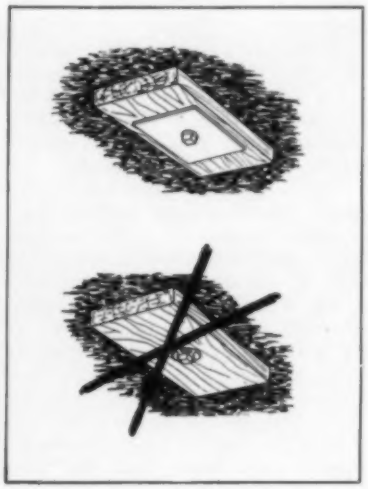
The supervisory force assisting the Messers. Schumacher includes Paul White, stripping foreman; Louis Miller, cleaning-plant and shop foreman; and Albert Shuhler, chief clerk.



TWO TYPES of ¾-IN BOLTS commonly used for roof support, with upset ears (left) and using a special locknut instead of upset ears (right). When the locknuts are used, they should be installed with open face down as shown in center.



CORRECT HOLE SIZE, a major factor in successful roof bolting, reflects proper drilling methods and careful attention to bit performance. This diameter gage provides an accurate, convenient check on drilled hole.



RIGHT AND WRONG WAYS of installing wood headers. Steel plates minimize decrease in bolt tension.

How to Install Roof Bolts

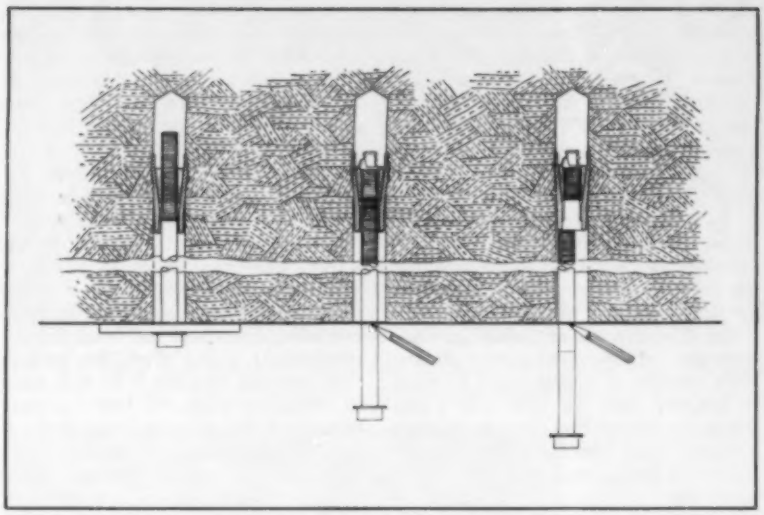
By E. F. HUSTON, Engineer
The Ohio Brass Co., Mansfield, Ohio

FEW INNOVATIONS have caused such a rapid change in coal mining technique as roof bolting, and for such good reasons. Present bolting practice is the outgrowth of constant development and experimentation by mine management, state and federal officials and manufacturers' research, a continuing process that is by no means ended. In view of the steady progress being made in mechanical mining and the importance of roof bolting to its major goals of greater safety and efficiency, many advances in bolting technique may be expected in the future.

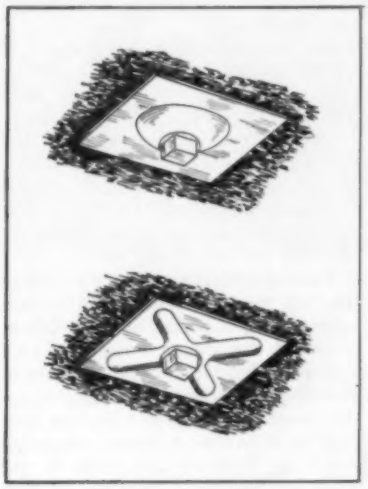
Mine conditions, methods of mining and the equipment used, naturally, determine the exact bolting practice employed at individual mine properties. But while the details of bolt installation may vary from mine to mine, there are common principles that make for successful, efficient bolting methods. The purpose of this article is to outline those that may be useful to mine personnel charged with supervising roof-bolt crews, particularly where bolting is done with threaded bolts and expansion units in holes made with rotary drills.

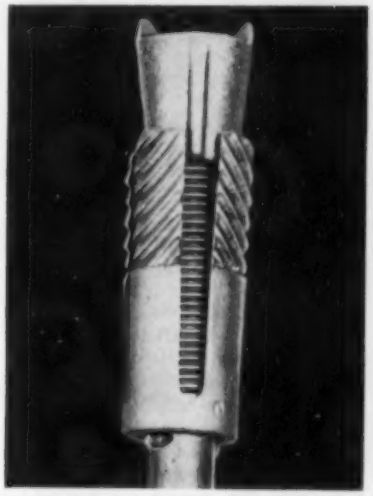
DRILLING ROOF HOLES

A factor often overlooked in bolting is the importance of the size of the hole at the point in the roof where the anchor is expanded. Unfortunately, a nominal 1⅜-in bit seldom drills a hole as small as 1⅜ in in diameter. For one thing, in



PERIODIC CHECKING of plug and shell as installed is worthwhile for good bolting. Bolt is chalked, re-inserted and marked in two positions (drawing). Pencil lines (photo) indicate distance between bottom of the shell and the plug.





LATE DEVELOPMENTS include steel roof plates formed or pressed (left) to provide stiffness in thinner and lighter materials. Bail-type expansion unit (right) is self-supporting and pre-assembled.

FOR BEST RESULTS, use only small overlap between shell and plug in assembling bolt components.

manufacturing bits all tolerance is "plus" so that a new bit will never be below its specified diameter, a practice that results in some bits being as much as 1/32 in oversize. But many other factors also contribute to oversize roof holes. Often when solid-point bits are reground, the points are not centered and, as a result, oversize holes are produced. Holes usually are at least 1/32 in larger than the bits used and there is even a greater tendency for bits to over-drill in soft material—the type of top in which maximum holding strength can be obtained only by using a minimum-size hole.

As bits are worn and reground, their diameters are reduced. Worn, undersize bits frequently can be used in the last few inches of drilling to produce a more desirable hole in which to expand roof anchors in soft material. If an expansion unit can be installed in a 1 5/16-in-diameter hole drilled in soft top, its holding strength will be considerably greater than in a larger hole. Some mines find an advantage in using a 1½- or 2-in "starter" bit and then finishing with a smaller one. For operators concerned with accurate control of bolting procedure, a gage for measuring the hole diameter at the expansion point is particularly useful.

Both straight and auger drill rods are commonly used in coal mines today. Although the auger type is more costly, it does tend to be guided or steadied by contact with the hole wall, thus producing a more accurate, smooth and straight hole. To permit cuttings to be more easily removed from the holes, straight drill rods are preferred where wet drilling is the practice. Water supplied through the hollow rods cools the bits and thus greatly prolongs their life. Worn rod sockets may contribute to bit chattering, and consequently to drilling of oversize, rifled holes.

Water is often used to control dust. It may be supplied to the bit through hollow drill rod or sprayed on the cuttings as they fall from the hole. In either case, little or no dust is formed to contaminate the air. Va-

cuum-type dust collectors have been improved to a point that they do a very effective job and are in common use.

BOLTS AND ROOF PLATES

For greater convenience in handling bolts above and below ground, roof bolts frequently are bundled in quantities of 10. They usually are shipped with a rust preventive on the threads, which often are further protected by burlap wrapping. A large percentage of headed roof bolts have upset ears just below the threads to provide support for the expansion shells, and sometimes there is difficulty in installation because of the ears being either too thick or too thin and short. One method to avoid such difficulty is the use of "PALNUTS" to provide a more uniform-strength support. The time required to screw the PALNUTS in place is usually negligible.

The most common roof plates measure ⅜x6x6 in and are made of mild steel. There is a definite trend, however, to thinner and lighter plates that are "formed" to provide increased stiffness and permit savings in original cost as well as in handling. Often commercial flat washers are used between the flash of the bolt heads and roof plates. They decrease friction and tend to increase the bolt tension resulting from a given bolt torque.

While generally the use of wood headers is to be discouraged, they are sometimes added to distribute the bolt load over a larger area where sloughing of the mine top is a problem. If the wood is not dry and creosoted, it may shrink. Crushing of the wood around the bolt holes may result from the use of small washers because of the localized high pressures. These factors favoring the decrease of bolt tension may be minimized by employing steel plates between the bolt heads and headers. If the wood is loaded in bending because of uneven bearing on the top, it may bow and also cause a relaxation of bolt tension. For these reasons, the installation of wood headers is not advisable unless unusual conditions prevail.

BOLT ASSEMBLY

It is the usual practice for one of the 2-man bolting crew to assemble the various roof-bolt components while the other man is operating the drilling machine. Correct positioning of the plug on the bolt with respect to the shell is a very important part of the assembly operation. The plug should be inside the shell only a short distance — just far enough to insure that the plug will not rotate as the bolt is turned. In this way, the shell fingers are free to flex and maintain contact with the hole wall as they are forced up in the hole. The expansion unit then can be installed in a minimum-size hole for maximum holding strength.

Various bail-type expansion units now are available which offer two advantages. They are self-supporting so that no means need be provided on the bolts for shell support; and since they are pre-assembled, no adjustment of the components on the bolt threads is necessary. The plug is screwed onto the bolt only a few turns to insure the threads starting properly and the assembly then is ready to be inserted into the drilled roof hole.

INSTALLATION

With most bolting machines now in use, the assembled bolt is forced into the bolt hole by the machine. Operators should be cautioned, however, against starting to rotate the bolt before the roof plate is firmly against the top. Unless this precaution is observed, there is a danger of the plug being screwed to the bottom end of the bolt threads before the bolt is tensioned.

It is generally agreed that a ¾-in roof bolt should be tightened to a torque of approximately 150 ft-lb. Since, under average conditions, approximately 60 lb of bolt tension is developed for each foot-pound of applied torque, this installed torque will develop approximately 9,000 lb of installed tension. After a bolt is tightened to this value, galling between the bolt head and the roof plate prevents much additional tension being developed by continued tightening. Little damage results, however, by tightening to 200 ft-lb if the roof plate is level. If it is not, the higher torque values may tend to twist off the bolt head.

The preceding paragraph assumes that the anchor is being expanded in hard top material. With soft top, however, there may be advantages in limiting the installed torque to below 150 ft-lb since the material may not support higher loadings. In extremely soft material, it is suggested that a few bolts be tightened with a hand torque wrench and the maximum torque observed. The reading should be obtained before the plug reaches the bottom end of the bolt threads, which can be determined by counting the turns of the bolt. The tightening device should then be adjusted to produce a bolt torque not exceeding the maximum wrench reading.

A torque wrench should be used frequently as a check on the proper adjustment of bolt-tightening equipment. Another valuable precaution is the periodic removal of a bolt after it has been installed in the normal manner to check the position of the plug with respect to the shell. To do this, the bolt should first be loosened and removed by a hand wrench to avoid disturbing the plug, which a bolting machine might do. The roof plate then is removed and a chalk mark made along one side of the bolt, extending from near the head for approximately 2 ft. When the bolt is then inserted into the hole, it is easy to determine when the bolt end contacts both the plug and the shell. A pencil mark is made on the chalk line, even with the line of the roof, when the top of the bolt makes both of these contacts. The distance from the plug to the bottom of the shell will then be accurately recorded by the space between the two pencil lines on the chalk mark.

The significance of this distance is sometimes not fully realized. If the plug is near the bottom of the shell (the two lines close together), there is little expansion reserve and the holding strength of the bolting unit is near its maximum. Soft roof material or oversize holes are two factors that may permit the plug to be drawn too near the bottom of the shell.

Various circumstances may change the bolt tension, as indicated by bolt torque, after a period of time. Often, increased loading as a result of roof action can be detected by an increase in torque. Different factors may cause the torque to decrease from the original value. A major reason, assuming wood headers are not used, is the creep or flow of some types of rock in which the anchors are expanded. Then, too, as a place near the face is bolted, there may be a movement of the roof that will loosen the bolts of the previous cut. It may be advisable in some cases to retighten the bolts if loosened by either of these causes, and since the great majority of relaxation will have occurred soon after installation, the retightened bolts will likely maintain their tension.

Changes are continually taking place in the roof-bolting picture and as the art of roof support by bolting advances, many other developments may be expected. A recent example of such change is the introduction of high-strength, high-carbon ⅝-in-diameter bolts. They offer equal or greater strength at a savings of 10% to 15% in cost. However, it would be inadvisable to increase the strength of bolts to a point where some might be brittle.

SMALL MINE BUT HIGH OUTPUT PER MAN—Adding loader (left) to serve shop-made low-height shuttle buggies doubled production from truck mine. Partially loaded buggy is shown under the loading-machine boom (right).

CABLE-POWERED CARS haul 2 tons of machine-loaded coal 640 ft per trip. Tripping a latch will permit the dropbottom doors to open and dump the load (right).

"Auto" Cars + Loaders = 20 TPM at Small Mine

SHUTTLE CARS made from automobile and truck parts and powered by electric motors supplied by dragging cables not only are "growing up" but are getting into "faster company" as well. Originated in 1- to 1½-ton capacities for the small hand-loading truck mine (*Coal Age*, April, 1953), they soon moved into a hand-loading low-coal conveyor mine producing 600 tpd (*Coal Age*, July, 1953). Next came increased capacity, up to 3 tons, intended primarily for hand loading (*Coal Age*, February, 1954). Now, several mines are using the cars to haul from loading machines.

At a truck operation of the Mohegan Pocahontas Coal Co., Mohegan, McDowell County, W. Va., for example, productivity per man-shift was increased from 10 to 20 tons by installing a Joy 12-BU machine to load into the automobile-type shuttle cars formerly hand-loaded in the mine.

This equipment, as illustrated, is used in a drift opening in the Davy-Sewell seam, there ranging from 40 to 48 in thick. Mining conditions include: a hard bottom, 1 to 12 in of black rash top, 6 to 7 in of laminated sand rock and rash which usually stays up, and above that a main top of strong sand rock. When the photos were taken, the loading machine was working 600 ft inby the portal and the shuttle cars were hauling to a dump 40 ft outside the portal.

The two shuttle cars were made by R. H. Murrill, operator of Bob's Welding Shop at Chesapeake, W. Va., who terms them the "Murrill Low-Vein Shuttle Buggy." They are of the dropbottom type and the drive is a 5-hp DC motor (*Coal Age*, July, 1953).

Cutting is done with a Goodman standard shortwall and drilling by hand. Four men do all the work and their accomplishment is usually 40 buggy loads (80 tons) dumped per shift. Originally, with the buggies, but without the loader, they produced 40 tons.

Editor's Note: Design, construction and operating details of the several types of shop-made shuttle cars in use at various mines in Kentucky and West Virginia are provided in the COAL AGE *articles referred to above, as follows: "Shuttle Cars From Autos," April, 1953, pp 88-91; "Dropbottom Cars From Autos Serve Kanawha Mines," July, 1953, pp 88-91; and "Shuttle Car Made From Auto Parts Now Hauls 3 Tons," February, 1954, p 116.*

GENERAL SESSION—Julian D. Conover (left), AMC executive vice president; Edward G. Fox, Philadelphia & Reading Coal & Iron Co., session chairman; J. D. Reilly, Hanna Coal Co., floor committeeman; Eugene Ayres, Gulf Research & Development Co.; and G. B. Southward, AMC.

SAFETY BOARD OF REVIEW—Edward Steidle (left), Pennsylvania State University (retired), chairman; E. R. Price, Inland Steel Co. (retired); C. R. Ferguson, United Mine Workers of America; J. S. Forsythe, general counsel; and Troy L. Back, executive secretary.

MECHANICAL MINING—Seated: R. G. Pfahler (left), Berwind White Coal Mining Co., session chairman; D. C. Howe, Jones & Laughlin Steel Corp.; Robert Yourston, Union Pacific Coal Co.; and F. E. Stewart, Jewell Ridge Coal Corp. Standing: H. W. Bauer (left), West Virginia Coal & Coke Corp.; Joe Craggs, Peabody Coal Co.; G. S. Jenkins, Clarkson Mfg. Co.; and Alex Grant, Buckeye Coal Co.

UNDERGROUND HAULAGE—Seated: C. R. Bourland (left), The New River Co., session chairman; R. U. Jackson, Hewitt-Robins, Inc.; J. W. Hardy, Goodman Mfg. Co.; and Thurman C. Harris Jr., Ingle Coal Corp. Standing: C. W. Williams (left), Red Jacket Coal Corp.; W. J. Shields, Rochester & Pittsburgh Coal Co.; and E. B. Leisenring Jr., Stonega Coke & Coal Co., floor committee.

PILLAR EXTRACTION—V. O. Murray (left), Union Pacific Coal Co., who presided over the second half of the roof support-pillar extraction meeting; George L. Judy, Consolidation Coal Co. (W. Va.); J. A. Younkins, Duquesne Light Co.; and D. J. Crawford, Lehigh Navigation Coal Co., who read a paper by C. S. Kuebler, of the same company.

ROOF SUPPORT—J. W. Broadway (left), vice president—operations, Bell & Zoller Coal Co., Chicago, who presided at the session; J. K. Berry, production engineer, Clinchfield Coal Corp., Dante, Va.; Martin Valeri, assistant to the general superintendent, Buckeye Coal Co., and M. M. Fitzwater, mining engineer of the same company.

AMC Scans Needs and Progress

Low cost and high quality are top themes as industry seeks to bridge gap to a bright and busy future—Big attendance is clue to earnest purpose of coal's leaders.

GETTING COST DOWN AND QUALITY UP were top themes as over 1,600 coal men, equipment manufacturers and allied interests gathered May 3 to 5 for the 1954 Coal Convention of the American Mining Congress at Cincinnati, Ohio. They heard representatives of the utility and oil industries predict booming markets for coal in the years ahead and they listened as their own fellows in the coal industry—mining men and equipment makers—showed the way to higher efficiency, better quality and improved safety. In detail, sessions at the three-day meeting covered roof support, mechanical mining, underground haulage, maintenance and power, continuous mining, stripping, preparation, safety and markets.

"We are meeting not to review the past but to assess the present and look to the future," said Julian Conover, AMC executive vice president and secretary. Opening the general session Monday morning, Mr. Conover made a plea for a strong minerals policy based on the national interest, urging that imports of residual fuel oil and other minerals be held at a "reasonable" level, adequate depletion allowances be sustained, provision be made for safe underground storage of natural gas, and rapid amortization be allowed for mining and water-purification equipment.

"Coal is about to end a long and discouraging holiday."

"What is coal's role in the century ahead?" asked Eugene Ayres, technical assistant to the executive vice president, Gulf Research & Development Co. Mr. Ayres was the first speaker at the Monday morning session, with Edward G. Fox, president, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., presiding.

Mr. Ayres cited and commented on eight industrial trends affecting demand for coal, as follows:

1. An electric-power economy is in the making. Average coal-burning efficiency is not likely to fall below 0.9 lb per kilowatt-hour before 1965. By that time, 85% of electric power will come from steam plants against 80% today and coal will carry about 80% of the fuel load against about 60% today. If these factors are taken into account and if the utilities, as expected, produce one trillion kilowatt-hours, they will burn more than 300,000,000 tons of coal in 1965.

2. Home use of power is growing faster than industrial use. By 1975, home use should be 12 times as great as now; farm use, about 20 times as great. Some authorities predict that by 1970, electric power will take over the major space-heating load.

3. Proportionally, hydro power must continue to decline. It seems unrealistic to expect hydro power to supply more than 15% of the load by 1965. Even in the TVA system, steam will account for over 80% of power production long before 1965.

4. When power demand rises to expected levels, the Nation may have even less petroleum than it needs for unique liquid-fuel applications. Peak of domestic petroleum production will come not later than 1965.

5. Imported petroleum will have to supplement domestic supplies. But as world demand for petroleum grows, less petroleum will be available for import to the United States. Energy sources should be the very last items to be excluded from any country, even the United States, because limited imports lead to higher prices for energy and thus weaken a nation's competitive advantage. In the years ahead, the coal industry must learn to live with necessary imports of oil. The only effect on coal will be to temper a little the extraordinary expansion that seems to be in the making for coal and to permit this expansion to approach at an orderly rate.

6. The peak of natural-gas production is likely to come about 1965. As demand grows and supply diminishes, rising prices will limit inferior uses of gas and leave the steam-raising field open for coal.

7. Residual fuel oil will be available in smaller quantities because of conversion to distillate fuels. By 1970, more than 80% of residual will be converted to distillate. This movement already is under way, especially along the Atlantic and Pacific coasts. Later, perhaps by 1980, as demand rises for liquid fuels, more liquid fuel will be produced from coal than from the sum of domestic and imported crude and shale.

8. Nuclear power is not likely to provide more than 5% of the Nation's total energy supply by 1975; by the turn of the century, perhaps as much as 10%.

Expressing the fear that increases in demand may come faster than the coal industry can meet them, Mr. Ayres saw possible demand for 900,000,000 tons by 1965; by 1970 or 1975, 1,200,000,000 tons. Vast sums now are being spent for research in coal by electric utilities, chemicals and other industries. Coal must set its sights on ways to lower the cost of producing coal, Mr. Ayres said.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

"There is no need for widespread accidents and disasters."

All members of the Federal Coal-Mine Safety Board of Review represent the public in seeking the just administration of the law, said Edward Steidle, chairman of the board. He was the first of five board representatives making up a panel to describe the authority and procedures of the board. Other panel members were: E. R. Price, manager of coal properties (retired), Inland Steel Co.; C. R. Ferguson, director, safety division, UMWA; T. L. Back, executive secretary of the board; and J. S. Forsythe, general counsel of the board.

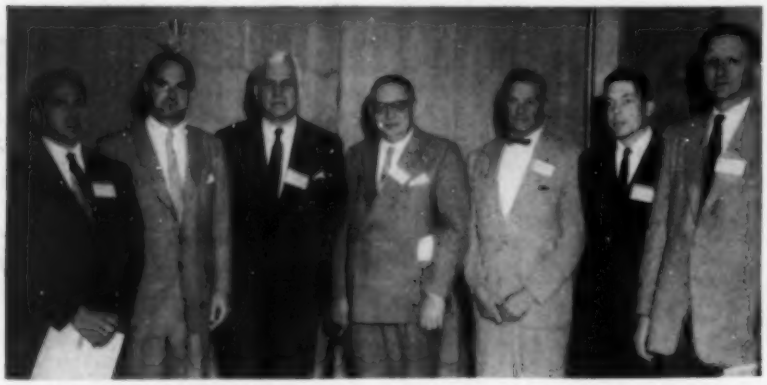
The Safety Board of Review does not solicit business and acts only when mine operators appeal the orders and decisions of federal inspectors or the Bureau of Mines, Dr. Steidle explained. "We believe the fact that the board thus far has not handled a great many appeals demonstrates conclusively that the board has exercised the moral influence necessary to establish and maintain cooperation between the Bureau of Mines and the coal-mining industry," he said.

Explaining that the Coal-Mine Safety Act of 1952 was aimed solely at prevention of major disasters, Mr. Price urged the industry, operators and mineworkers alike, to assume the responsibility of reducing fatalities in the accident category, lest the federal government intrude still further. He asked also for closer cooperation between operators and mineworkers on the one hand and the Bureau of Mines on the other, especially in promoting accident-prevention courses for workers and supervisors.

The moral influence of the Board of Review has been a deterrent against arbitrary actions by federal inspectors and against operators who otherwise might appeal cases that would not be legally sustainable, Mr. Ferguson said. Safety is the duty of operators, federal and state agencies, the UMWA and others concerned, he said.

Under the Coal-Mine Safety Act of 1952, Mr. Forsythe explained, federal inspectors are empowered to: (1) close a mine if imminent danger of disaster is found; (2) close a mine if an operator fails to abate a violation within reason-

CONTINUOUS MINING—G. A. Shoemaker (left), Pittsburgh Consolidation Coal Co., chairman; J. W. McDonald, Old Ben Coal Corp.; E. M. Pace, Inland Steel Co.; Richard Graham, Saginaw Dock & Terminal Co.; R. C. Beerbower Jr., U. S. Steel Corp.; C. B. Tillson Jr., Crucible Steel Co.; F. R. Zachar, Christopher Coal Co.; W. D. Hawley, Eastern Gas & Fuel Associates; J. S. Todhunter, Barnes & Tucker Co.; and J. D. Reilly, Hanna Coal Co., floor committeeman for the continuous-mining session.



STRIPPING AND BLASTING—E. R. Phelps (left), Pittsburg & Midway Coal Mining Co., presiding; T. M. Ware, International Minerals & Chemical Corp.; J. W. Woomer, J. W. Woomer & Associates; J. E. Jenkins, Vibration Measurement Engineers; J. L. Romig, Atlas Powder Co.; R. H. Uhl, W. G. Duncan Coal Co.; and S. F. Sherwood, Sherwood-Templeton Coal Co., floor committee.

STRIPPING AND AUGERING—H. C. Livingston (left), Truax-Traer Coal Co., session chairman; Andrew Hyslop, Hanna Coal Co. Div., Pittsburgh Consolidation Coal Co.; L. E. Briscoe, Ayrshire Collieries Corp.; E. J. Dress, United Electric Coal Cos.; Kenneth O. Shaner, Mech Mining Co.; D. A. Zegeer, Consolidation Coal Co. (Ky.); and John W. Davies, Shen-Penn Production Co.

able time; and (3) classify a mine "gassy" if methane exceeds 0.25%. An operator may appeal any of these decisions to the Board of Review, requesting temporary relief pending a full hearing. The appeal to the board should include the following: name and address of the operator and the mine; the order complained of and a copy of that order; the relief desired; and other facts needed to inform the board of the nature of the proceeding. A copy of the application for hearing should be sent to the Director, USBM. In all appeals, the burden of proof is on the director of the Bureau, Mr. Forsythe pointed out. He explained also that the board is empowered to consider alleged violations of the Coal Mine Safety Act, not alleged violations of the Federal Mine Safety Code.

The board tries to act promptly on all appeals, Mr. Back stated, and thus far has been able to fix the date of hearings and send out notices on the same day appeals have been received. Appeals may be entered by telephone or telegraph provided they are confirmed by written appeals as outlined by Mr. Forsythe. Mr. Back added that the board works with minimum rules and simple procedures. Sets of simple forms that may be used in filing appeals are available upon request to the board.

In answering questions about operations of the board and related matters, Mr. Price and Mr. Ferguson advised, respectively, that operators assign a top official and mineworkers a union official to accompany federal inspectors on mine tours. Mr. Ferguson added that because the board always has been considerate in granting temporary relief from closing orders, operators need not fear heavy financial losses. Mr. Forsythe pointed out that it usually takes 1 hr to 2 days to present a case to the board and obtain a decision. Mr. Price advised that operators who appeal to the board should employ counsel, though there is nothing to forbid an operator's handling his own case. He pointed out that the board requires no filing fees but that operators do bear the expenses of their witnesses and attorneys. Though hearings usually are held at Washington, Mr. Forsythe explained that they may be held elsewhere—at the mine, for example, if most of the witnesses are there.

At the luncheon preceding the Monday afternoon session, Felix Wormser, assistant secretary, Department of the Interior, told those attending that the present administration in Washington does not intend to intervene in coal's present situation by imposing controls on markets, prices or production or by providing subsidies. He pledged, however, that the government will continue its research into new uses for coal and its surveys of resources. Turning to the question of imported residual fuel oil, he explained that the administration must weigh the interests of other industries as well as those of coal and must keep national security paramount. The coal industry's goal, he said, will be reached not through restrictions but through research and development in the extraction and utilization of coal.

"Nuclear power—little in the next decade; far from great in 20 yr."

Development of atomic energy for peaceful uses will substantially advance our economy and our standards of living and, if conscientiously done, will hurt nobody and help many, said Walker Cisler, president, The Detroit Edison Co., Detroit, Mich. Mr. Cisler spoke at the luncheon Tuesday, R. K. Gottshall, president, Atlas Powder Co., Wilmington, Del., presiding.

Today, several groups of private corporations are engaged in research on nuclear power, as is the Atomic Energy Commission, and several large test installations doubtless will be built within the next 5 yr, Mr. Cisler said. But he expressed doubt that atomic fission will contribute any substantial quantities of commercial electric power for the next 10 to 20 yr. The big obstacles are: (1) the price and availability of fissionable fuel compared with fossil fuels; (2) the high capital cost of a reactor; (3) the questionable sale value of fission byproducts; and (4) the legal problems posed by the Atomic Energy Act.

Citing the outlook for the growth of electric power, Mr. Cisler said that at least 30,000,000 kw of new thermal capacity is scheduled by 1957 and that coal use probably will rise to at least 165,000,000 tons per year by that time; by 1975, possibly to 250,000,000 tons. In the expected growth of electric power, atomic energy will only help fill out expanding needs, he predicted.

Supporting Roof

"The door is open for bit makers to give us bits capable of greater footage."

Drilling for roof bolts in sandstone with a Fletcher hydraulically operated high-torque high-pressure drill was described by J. K. Berry, production engineer, Clinchfield Coal Corp., Dante, Va. Mr. Berry was kick-off speaker at the session on roof support and pillar extraction Monday afternoon, with J. W. Broadway, vice president, Bell & Zoller Coal Co., Chicago, presiding.

Mr. Berry reported that some sandrock areas have been drilled faster and with no greater bit consumption than formerly was true in soft shale with the old low-torque high-rotation low-pressure drills. Some sandrock, however, is so hard and so destructive to bits that it is economical to drill it only because of special attendant conditions. He said the new drills have opened the way for bit makers to produce bits capable of still better footage.

The Fletcher drill, powered by a 10-hp motor, supplies 250 ft-lb torque to the drill chuck with speed variable from 700 rpm down to 0 and, by reason of a foot jack, can exert 7,000 lb pressure against the roof. A Mine Safety Appliances Co. dry dust collector, USBM-

MAINTENANCE AND POWER—C. Ray Huffman (left), Monongahela Power Co., floor committeeman; H. S. Lowry, Snow Hill Coal Corp., session chairman; Donald Smith, The Hudson Coal Co.; J. A. Duncan, Island Creek Coal Co.; T. R. Weichel, Hazard Insulated Wire Works; Gerald von Stroh and Robert Dice, Mining Development Committee, Bituminous Coal Research, Inc.

COAL MARKETS AND PREPARATION—G. R. Watkins (left), United States Fuel Co., session chairman; J. B. Morrow, Alford, Morrow & Associates; J. W. Forman, Pocahontas Fuel Co., Inc.; D. C. Snyder, Mt. Hope Coal Co.; H. F. Yancey, U. S. Bureau of Mines; and George O. Tarleton, Consolidation Coal Co. (Ky.), floor committeeman.

PREPARATION AND STREAM PURIFICATION—R. E. Kirk (left), Tennessee Coal & Iron Div., chairman; W. A. Weimer, Northern Illinois Coal Corp.; T. W. Guy, consultant; Richard Mullins, Ayrshire Collieries Corp.; R. A. Lewis, Carbon Fuel Co.; H. F. Hebley, Pittsburgh Consol.; and J. S. Forman, Mt. Olive & Staunton Coal Co., floor committee.

approved, is built into the machine, Mr. Berry said.

Operating behind a continuous miner in the Lower Banner seam and installing 36-in bolts through about 2 ft of fairly soft shale and into a hard, fine-grained sandstone, average drilling time is 68 sec for a 3-ft hole and total work time per bolt is 2¼ min. In a series of time studies, total bolts per shift ran 100 to 135, and 100 to 135 ft of hole was drilled before a slight bit dulling required resharpening. Mr. Berry emphasized the need for resharpening bits when they become only slightly dulled, since a dull bit wears down four or five times as fast as a sharp one and requires heavy grinding and a waste of carbide to restore. Contrasted to a sandstone penetration of 35 ft per sharpening in the Lower Banner is a penetration of only 20 in in an extremely hard sandstone being bolted in the Clintwood seam, Mr. Berry pointed out.

"Roof-bolting has contributed more than any other single factor."

An outside air compressor station for roof-bolting has many advantages, according to Martin Valeri, assistant to the general superintendent, and M. M. Fitzwater Jr., junior mining engineer, Buckeye Coal Co., Nemacolin, Pa. These advantages are: (1) constant pressure at the stopers; (2) elimination of overtime for the bolting crew, together with a margin for more than the average number of bolts per shift; (3) negligible compressor maintenance; (4) uniform voltage and better power factor for the 500-hp synchronous motor driving the compressor; (5) lower power cost by elimination of 50-hp DC motor compressors; (6) elimination of underground rubber-tired compressors with their trailing cables; (7) clean intake air; (8) elimination of water trouble in lines and drills; (9) bigger receiver capacity; (10) less attention and less maintenance; and (11) savings in capital cost.

In this Pittsburgh-seam mine, 1-in wedge-type bolts of 5- and 6-ft lengths are used, Mr. Valeri explained. Bolting was started in November, 1950. Since then, some 380,000 bolts have been installed with the result that less than 1% of the intersections have collapsed compared with 40% with conventional timbering. Before installing a central compressor and the pipe distribution system, portable compressors at the face and stationary compressors within 400 ft of the face were tried. Mechanical trouble with the units and water in the tanks and lines, all adding up to down time, brought the decision to install a 2,600-cfm compressor at a new 500-ft shaft and distribute the air by a system of 6-, 4- and 2-in underground pipes, limiting the 2-in pipe to 2,000 ft. Although drilling footage is not over 10 to 15 per bit, tungsten-carbide bits are not used because trials did not justify their cost, Mr. Valeri said.

Bringing a "squeeze" under control by installing imported "Clockenprofil" 13-ft diameter rings on 2-ft centers in a tunnel was described by C. S. Kuebler, assistant mining engineer, Lehigh Navigation Coal Co., Lansford, Pa. Mr. Kuebler's paper (*Coal Age*, April, 1954, p 92) was read by D. J. Cranford, LNC mining research engineer.

"Our reasons for pillaring can be summed up in economics and conservation."

The flatter the pillar line, the better savings in roof control in pillar panel development and retreat pillaring, reported G. L. Judy, vice president, Consolidation Coal Co. (W. Va.) Mr. Judy described experiences of his company in taking 70x95-ft pillars by conventional shuttle cars, rubber-tired cutting machines and cat-mounted loaders in the 9-ft Pittsburgh seam. Changing from a 45-deg angle to a 22½-deg angle eliminated a squeezing action usually encountered in the last two cuts in a split, he said.

Mr. Judy set forth eight points that he considers important for good pillaring, as follows: (1) block size; (2) flat pillar line; (3) no stumps or blocks to prevent a clean break; (4) rapid completion of the panel; (5) due consideration to the overburden and width of the first panel; (6) pillar line in step; (7) efficient water handling; and (8) good supervision.

Use of roof bolts was a big help in pillaring, Mr. Judy declared. In a study of two panels side by side, one worked with wooden timbers and the other with roof bolts, the summary for the panel development was as follows:

Additional tons per shift using bolts	106.36
Additional tons per man using bolts	3.2
Net savings in roof-control material costs per ton	4.1c

For retreat pillaring of the panels, Mr. Judy showed the following:

Additional tons per shift using bolts	96.88
Additional tons per man using bolts	6.56
Savings in material and labor using bolts, per ton	15.8c

In addition, Mr. Judy stated, clean-up is much improved with bolts—88.91% as compared with 82.26% when timbers were used.

Presenting slides showing blocks taken with the pressure line flat, J. A. Younkins, assistant general superintendent, Duquesne Light Co., Pittsburgh, discussed pillar extraction with continuous miners in his company's Harwick mine. In that mine, he said, a 300-ft span is required for the first major break, after which breaks usually follow about every 50 ft.

Mechanical Mining Underground

"There have been no reports of major accidents involving hydraulic drills."

Improvement of about 15% in production per man at the face on track units following introduction of hand-held hydraulic coal drills was reported by D. C. Howe, mines industrial engineer, Vesta-Shannopin Coal Div., Jones & Laughlin Steel Corp., California, Pa. Mr. Howe led off at the mechanical-mining session Tuesday morning. R. G. Pfahler, consulting engineer, Berwind-White Coal Mining Co., Philadelphia, Pa., was session chairman.

Used at Vesta No. 4 mine, the hand-held hydraulic drills, made by Schroeder Bros., are the result of a prototype built by John Wiseman and Ira Sams, master mechanics at mines of Christopher Coal Co., and are designed to be powered from the hydraulic system of a Jeffrey 29U cutting machine, Mr. Howe explained. At Vesta No. 5 mine, in spite of poorer mining conditions, the track units equipped with the hydraulic drills have made an improvement of about 10% in man-shift face output. All three mines of the company have been changed from track-mounted electric drills to hydraulic drills.

Thread bars, brass clutch bushings and trailing cables have been saved by the change, Mr. Howe pointed out. Also, at one mine where it once took two mechanics full time to repair electrical parts of track-mounted drills, one part-time man now maintains the hydraulic drills. Safety is improved by eliminating the following: (1) danger that a drill will throw a driller; (2) danger that clothing will be caught in threadbars, augers and other rotating parts; and (3) danger from motors and trailing cables in the face area.

Difficulties from the binding of resharpened bits were overcome by going to larger sizes, Mr. Howe stated. The present practice is to use 1⅝x8-in powder, 1⅝-in bits and 1⅝-in augers. Other advantages of the larger bits and augers are reduced choking and binding and less bending and breaking. These factors permit drilling speed to remain the same as it was with the smaller bits.

"Seam characteristics and available machines dictate the method of attack."

Face operations with rubber-tired universal cutting machines, crawler-mounted loaders and mobile rubber-tired single-boom drills in a pitching seam were described by Robert Yourston, resident engineer, Union Pacific Coal Co., Stansbury, Wyo. There, a panel system is operated driving strike rooms. One of the two rubber-tired cutters, transferred from the Hanna district and put into the mine in 1950, has cut 465,000 tons of coal with one major overhaul, made in the summer of 1950. The second cutter, new in 1951, produced 195,000 tons through 1953 and shows no signs of needing major over-

haul. Cutter bars are 9 ft long and use reversible hard-tipped bits. The mining is in seam thicknesses of 6 to 14 ft.

All tramming movements up the pitch or through slants are made in low gear averaging about 35 fpm, Mr. Yourston reported. On the steepest grades, the machine must be backed up the pitch to throw greater weight on the driving wheels. Rubber-tired drills, which have proved satisfactory in the high coal, have little trouble maneuvering the pitch but occasionally a man must ride the boom to increase driving-wheel weight. Roof-bolting with rotary drills is usual in areas mining 6 to 7 ft; timbering with crossbars where the height is greater.

In the No. 7½ seam, a third mobile unit outfitted with crawler-mounted shuttle cars soon will go into production in an area with a 23% grade. Rooms will drive directly up the pitch, as has been the company's practice with the room-and-pillar system and shaking conveyors, Mr. Yourston said.

"A high-quality 5-ft seam is fast becoming a scarce piece of real estate."

Changes in practice leading to complete mechanization were discussed by F. F. Stewart, superintendent, Jewell Ridge Coal Corp., Tilford, Ky. The changes resulted in 2-shift production of 4,200 tons of clean coal with 300 employees and five Joy 14BU units, compared with previous performance of six units working two shifts to produce 2,400 tons with 323 employees on the payroll. In the poorer record, only 44 to 48 in of the 5-ft seam was mined. Changes in marketing policy now permit the company to take bottom coal formerly left in places.

Other machines besides the seven Joy 14BU loaders, high-pedestal type, include seven 10RU Joy cutting machines, seven Joy CD22 rubber-tired drills and fourteen 42E shuttle cars, Mr. Stewart said. One section is operated with Piggyback conveyors (*Coal Age*, December, 1953, p. 72). Shuttle-car sections use 12-man crews and the Piggyback section an 11-man crew. Peak tonnages by shuttle cars are greater when haulage distances are short, while with the Piggyback system distance does not affect tonnage. Over a 20-day period, the Piggyback section maintained a better average per man on the section but was behind in peak tonnage per shift—672 against 852 tons of material.

Shuttle cars load directly into mine cars, Mr. Stewart explained. He set forth the following important factors in success with the method: (1) proper development plan with maximum haulage distance carefully gaged and section moved when ready; (2) capacity of one shuttle car equal to that of one mine car if possible, and double roadways used to the fullest; (3) strict compliance with the cycle method, with emphasis on keeping all crosscuts open for roadways; (4) maintenance of roadways in best possible condition; (5) anchoring of shuttle-car cables permanently for each setup; and (6) proper suspension of cables for companion machinery at crossings.

"We employ relatively small face crews on our mobile loading sections."

The efficiency of large and small crews in mechanical mining was discussed in three papers. Discounting investment cost, H. W. Bauer, division manager, West Virginia Coal & Coke Co., Omar, W. Va., said that short crews have the following advantages: (1) better safety record per ton; (2) higher tons per manday; (3) lower mine maintenance because of better concentration; (4) increased efficiency; (5) lower production costs; and (6) more uniform production. Mr. Bauer's paper described methods in the 44-in Island Creek seam using 14BU loaders, 29LC cutters, 32E shuttle cars and 56A cat-mounted drills, and included a summary of 32 time studies made over a period of 4 mo. Crew size averages 10.8 men but a new mining plan has been developed that will reduce crew size by 2.5 men. Mr. Bauer said that the largest single factor contributing to crew size is the effectiveness of the maintenance program.

"Since labor cost is of prime importance, we must reduce it with modern machinery."

Crew size for conditions in the Central Illinois No. 6 seam and the Southern Illinois No. 5 seam was discussed by Joe Craggs, field superintendent of operations, Peabody Coal Co., Taylorville, Ill. In No. 6 mining, where shaft depths are from 350 to 720 ft and seam thickness 5 to 8 ft, high overall tonnage and large equipment are necessary. The company's large units are made up as follows: one 11BU loader, one 10RU universal cutter, two or three 10SC shuttle cars and two rubber-tired double-arm electric rotary drill jeeps. Crew size is based upon keeping the loading machine operating at its maximum tonnage up to a point of diminishing returns. Production requirement is set at 700 to 900 tons with a minimum of two shuttle cars. When hauls exceed 400 to 500 ft, a third shuttle car can boost production 2 to 7 tons per man.

Small crews, Mr. Craggs said, have a place in certain phases of development work, in a confined area and in close proximity to a large crew unit where men of the large unit can be of service to the small unit also.

At Peabody mines in Southern Illinois, Mr. Craggs explained that seam depth ranges from 290 to 380 ft; seam thickness, from 4 ft to 4 ft 10 in. Here the base of production is the 14BU loading machine with two to three 5SC shuttle cars loading onto belts. Loading capacity is 5 to 10% lower than in the central field. A large crew and a small crew are used to advantage in the same panel because the repairman, belt clean-up man and, in some cases a timberman and part-time brattice man of the large crew have time to handle non-productive work for a six-man crew. Tons per man at the face runs 27 to 31 for the small crew and slightly lower for the large crew. Three large units require 51 men, but two large units and two small units require 48 men to produce the same tonnage, Mr. Craggs said.

"The question of crew size probably never will be settled to please everybody."

The manufacturer's viewpoint on small v large crews was discussed by C. S. Jenkins, president, Clarkson Mfg. Co., Nashville, Ill. Although he admitted being rather partial to a very short crew and a smaller production, he said the many varied conditions encountered in the different fields make it impossible to draw any definite conclusions. He reviewed the progress in mechanical loading and the various bottlenecks that have appeared. Maintenance, developed by mining progress, is the new bottleneck, he contended. Down time becomes more and more costly as production and crews are increased. He mentioned a figure of $11 per minute of down time as loss, including realization on an 800-ton 18-man crew.

Comparing operations in 7-ft coal with operations in 44-in coal, Mr. Jenkins said that double the investment for the thin seam is not far out of line and, since double the number of places must be loaded and cared for, a labor-cost figure twice as high may not be far out of line. He presented hypothetical figures covering performance and costs for an 800-ton 18-man unit and a 400-ton 10-man unit. In the first case, the ratio of depreciation to labor cost is about 1 to 10, while in the 400-ton operation it is about 1 to 8. Depreciation expressed in men per shift for the 800-ton unit is 1.87; for the 400-ton unit, 1.25. If the mine operates only 100 days per year, double shift, the depreciation per ton doubles; that is, it is equivalent to 3¾ men for the 800-ton 18-man unit and 2½ men for the 400-ton 10-man crew.

Hauling Coal Underground

"Belt conveying requires proper servicing and maintenance."

Belt conveyor maintenance calls for good housekeeping from beginning to end, said R. U. Jackson, Mine Conveyor Sales & Development Div., Hewitt-Robins, Inc. Mr. Jackson was lead-off speaker at the haulage session Tuesday afternoon, with C. R. Bourland, vice president, The New River Co., Mt. Hope, W. Va., presiding.

Being simple and requiring no operators for individual units, the belt-conveyor system often is neglected until trouble develops, Mr. Jackson declared. Pointing out that maintenance begins with selection of the equipment, he suggested rules for belt installation and operation, discussed electrical controls for safety and gave pointers on fire prevention.

Over-motoring a long or steeply inclined belt is unsafe because overload starting power is no help to the belt, Mr. Jackson explained. High-tension belts should be started by controlled acceleration rather than across-the-line starting. Dual pulley drives should be used only when required to reduce belt tension and always should be properly lagged, preferably with grooved rubber. Long or slightly inclined belts should have a gravity take-up directly back of the drive, while on inclines over 13 to 14 deg, it usually is preferable to put the automatic take-up at the tail end.

For mine conveyor service, the pulley should be at least 4 in wider than the belt, Mr. Jackson said. Return idlers should be set far enough below the conveyor stringers to permit inspection and observation of belt training. Return idlers spaced 12 ft rather than 8 ft will do better training. In splicing, belts never should be squared from the belt edge but from an average center line at least 15 ft back from each end.

Mr. Jackson made the following suggestions regarding electrical controls for safety and efficiency:

1. A stepped resistance for each drive.
2. Timing relay sequence starting.
3. Centrifugal switch near the tail of each conveyor to stop all following belts automatically.
4. Mercury-type level momentary switch to stop all inby belts if spillage is threatened at a transfer point.
5. Controls for independent operation, thus simplifying maintenance.
6. Stop control by cord or pinch-type wires, full length over the conveyor.
7. Drive-pulley slippage control by centrifugal switch driven from the belt or a snub pulley, or by differential motion between drives in the belt and drive pulley.

On fire prevention and the causes of fire, Mr. Jackson offered the following suggestions:

1. Eliminate pulley-drive slippage by automatic take-up and electrical slippage control.
2. Maintain good housekeeping, especially by preventing grease and fine coal from collecting around the idler.
3. Inspect and maintain the belt regularly to prevent wear against the conveyor frames.
4. Install power lines in conduit or at some distance from the belt.

"A belt conveyor can be compared favorably to a mule."

Picking the right man to maintain the belt system was stressed by J. W. Hardy, Goodman Mfg. Co., Chicago, who discussed Mr. Jackson's paper. The man selected for maintenance should be intelligent and conscientious and should like belt conveyors, Mr. Hardy said. He warned against putting top mechanics to work maintaining a $25,000 loading machine or a $75,000 continuous miner while putting an unskilled spare man on a $100,000 to $200,000 belt. The belt man should be carefully chosen and well trained and he should be proud of the continuity of belt operation and his own ability to make quick moves to maintain production.

Mr. Hardy summarized belt-maintenance needs as follows:

1. Capable labor, trained by the manufacturer.
2. Good housekeeping.
3. Quality equipment, selected with a view to maintenance over the years.
4. Good loading stations to prevent spillage, belt damage and severe impact on bare idlers.
5. Equipment of adequate capacity, with precautions against over-loading and over-extending.
6. Automatic controls to prevent damage.
7. A good belt shop on the property, or a commercial shop close by.
8. Good maintenance.

"Our methods and practices result from experiences and time studies."

Speeding shuttle-car discharge, shortening shuttle-car travel and making quick mine-car trip changes have been the most helpful factors in increasing production from shuttle-car haulage to mine cars, said Thurman Harris Jr., assistant engineer, Ingle Coal Corp., Elberfeld, Ind. At the Ditney Hill mine, operated with battery-powered and cable-reel shuttle cars, average daily production from 1941 to 1953 was 3,330 tons on a double-shift basis. The 1953 double-shift average was 3,808 tons, an increase of 377 tons over 1952 and 478 tons better than the 12-yr average.

At the Ditney Hill mine, the Indiana No. 6 seam averages from 6 to 10 ft, over-burden averages 200 ft and the rolling grades reach 12%, Mr. Harris reported. In mining, 6 to 18 in of top coal is left to support weak top. Ramp loading, elevating conveyors and direct loading from shuttle cars to mine cars have been used. Today, ramp loading is most often used because it is fastest and cheapest. The bottom is graded to depress the track and wooden ramps are built on each side toward opposite breakthroughs, thus accommodating the discharge of shuttle cars operating on both sides of the panel. Elevating conveyors are used where seam grades make ramp grading impracticable.

Principal equipment for each of the five working units or sections is as follows, Mr. Harris said: shortwall cutting machine, electric drill on self-propelled truck, Airdox shooting facilities, 11BU loader, and three battery shuttle cars or two cable-reel shuttle cars and one battery shuttle car. Usually, the third shuttle car serves as a spare but on upgrade haulage the third car is used in production. Roof bolts are used on main entries. Posts with some cross-bars are used in rooms.

"Our system of loading belt conveyors is satisfactory to us."

How shaker feeders are used for shuttle-car loading onto belt conveyors was described by C. H. Williams, chief engineer, Red Jacket Coal Corp., Red Jacket, W. Va. Sixty per cent of the company's work is in seams of less than 40 in, Mr. Williams pointed out. Shuttle-car loading directly into mine cars has been found preferable when it can be done without grading for additional haulway height. In mining coal less than 40 in thick, shuttle-car loading onto belt conveyors is preferred practice. After experience with shuttle cars loading directly onto belts and with shuttle cars on steel ramps discharging into a chain conveyor, the shaker feeder became available and now has been adopted. Fifteen of the latter units now are in service.

The shaker units are rugged and maintenance is low, although care must be taken to install the units laterally level, Mr. Williams said. In a 38-in seam, the shaker drive usually requires a bottom excavation 7x4 ft by 4 in deep. Steel plates are placed under the wheels of the shaking parts. The hopper receives 3½ tons of coal and normally feeds it onto the belt conveyor in 2½ min. The shuttle-car operator starts the feeder and it is shut down by a time relay. The system is entirely satisfactory, Mr. Williams said.

The extensible belt conveyor offers opportunity to reduce crew size without reducing tonnage, said W. J. Shields, chief mining engineer, Rochester & Pittsburgh Coal Co., Indiana, Pa. An article on the unit appears in this issue of *Coal Age*, p. 88.

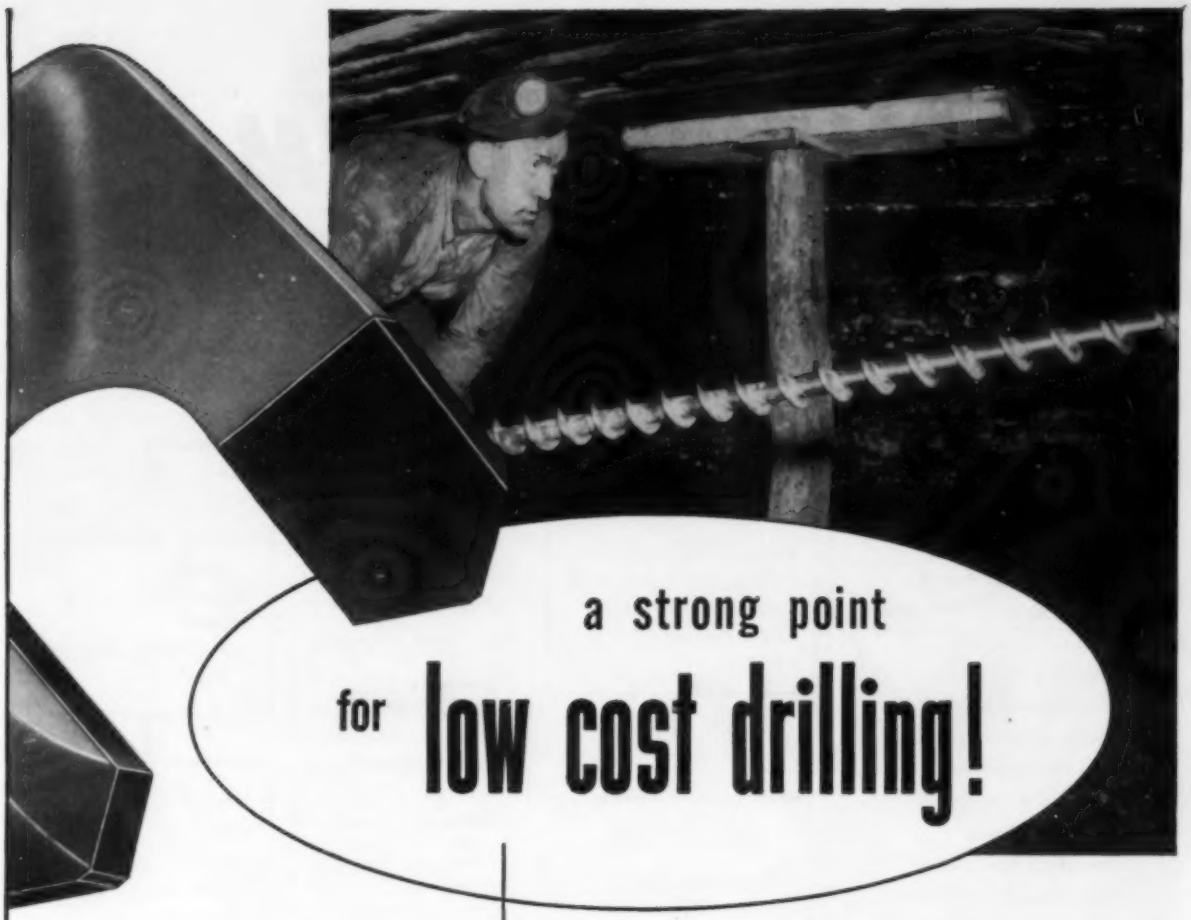
Maintenance, Power and Illumination

"The true measure of the value of equipment is its dependability."

Good maintenance requires adherence to seven fundamental rules, said Donald N. Smith, superintendent of shops, The Hudson Coal Co., Scranton, Pa., in opening the power and maintenance session May 5, with a description of organization and practice at mines of his company. Ringmaster at the session was Harold S. Lowry, Snow Hill Coal Corp., Terre Haute, Ind. Mr. Smith's seven fundamentals are:

1. Cleanliness.
2. Regular and systematic inspection by responsible persons.
3. Proper records to show whether the maintenance men or the repair shop is responsible for early parts failures.

Continued on p. 160



a strong point for low cost drilling!

12,000 feet of drilling

Kennametal D-1-3/8" Bit delivered this outstanding footage in Coshocton County, Ohio. Bit was reground 40 times, still retained its hard Kennametal Tips.

37 full drilling shifts

Kennametal D-2" Bit gave this superior service in the Pittsburgh 8 Seam, West Virginia. Reground 37 times — an average of once per shift.

Point is: Hard Kennametal tungsten carbide, unequalled for shock and wear resistance, is an important partner in low cost drilling.

Kennametal drill bits stay sharp longer, are good for 3000 to 7000 feet under normal conditions. Bit reconditioning costs are lower. Substantial savings are made in armature repairs and drill maintenance. Head design assures faster chipping action, provides maximum freedom for cuttings to pass into auger — increased rates of penetration result.

Any of your rotary drilling problems can be solved with one of the 39 styles of Kennametal drill bits. They are sold by veteran mining men who will gladly demonstrate them for you. Call in your Kennametal representative anytime, without obligation.

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book — or, write direct.

World's Largest Manufacturer of Tungsten-Carbide

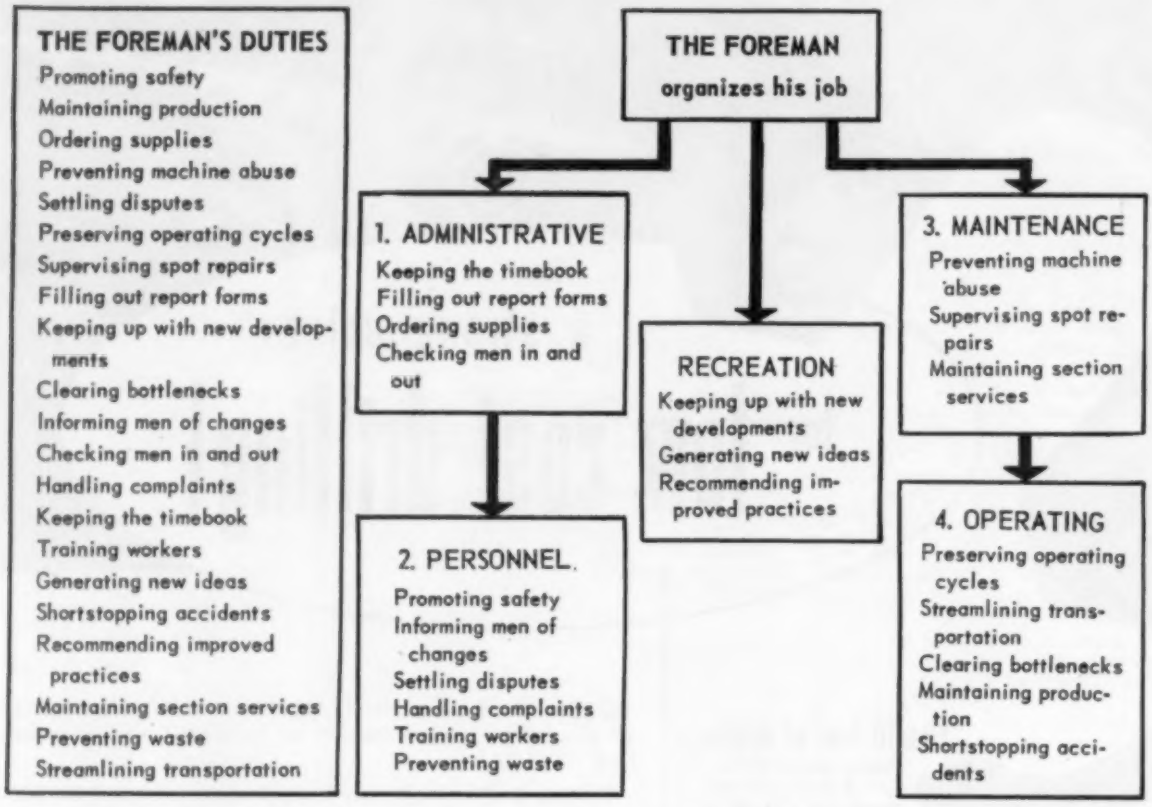
Drill Bits, Cutter Bits, Roof Bits, Strip Bits

KENNAMETAL®

KENNAMETAL INC., MINING TOOL DIVISION
BEDFORD, PA.

General Offices and Main Plant at Latrobe, Pa.

FOREMEN'S FORUM



TRYING TO WORK from the list of duties at the left would be extremely difficult. Organizing your job, as shown at right, will make you more effective and perhaps provide you with time to think about the things you would like to improve in your operations.

How to Enjoy Recreation On Company Time

Here are the steps:

1. **Study your job thoughtfully**
2. **Catalog your responsibilities**
3. **Discharge these responsibilities fully**
4. **You should have time left over for working on projects you want to develop**

THE ARRIVAL OF THE MONTH OF JUNE no doubt finds most of us thinking of our up-coming vacations. Perhaps your plans for your vacation already have been carefully made, and we feel confident they call for a complete change in your normal routine. That's good. A change from normal routine always is refreshing. Such a change is called recreation.

But why wait for an annual vacation to indulge your desires for recreation? We propose to demonstrate here that you can enjoy recreation every day on the company's time—legitimately! In fact, the company may come to love you for it.

Some of your colleagues may have the secret already. It merely is a matter of thoughtful job organization. Let's take a look at your job.

A list of some of your duties appears at the left in the illustration above. That cruel list could drive anyone to the brink of hysteria. It's impossible to function consistently at a high level when faced with such a host of supervisory responsibilities. And none of these can be shirked if you are going to do your job

Note excellent flexibility of U.S. Royal Shielded Cables.

There's plenty of "drag miles" in U. S. ROYAL SHIELDED TRAILING CABLES

The constant dragging, flexing, twisting and bruising encountered in heavy service do not bother U.S. Royal Shielded Cables. The rugged jacket contains 60% by weight of neoprene; this jacket is cured in lead—all for more durability, more "drag miles". Consider also more than just the initial cost! Achieve a new low in your cable replacement costs—a new high in performance by specifying U. S. Royal Shielded Trailing Cable, the cable that can take a beating and come back for more.

FREE BOOKLET

Send for free illustrated booklet on U. S. Electrical Wires and Cables for the coal mining industry.

Here's the key to U. S. Royal's great performance; United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, manufacture its own synthetic rubber and its own plastics. This means *control of production* every step of the way—resulting in a better and more efficient product.

US RUBBER

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department • Rockefeller Center, New York 20, N. Y.

right. How can they expect one man to shoulder that burden, you ask. This is impossible, you say.

But wait. Just before you sink for the third time beneath the surface of your sea of troubles, take another look. The chart alongside the list is our crude first attempt to organize the job. All duties in the list also appear in the chart, but in a more palatable form. Take note of a peculiar characteristic of each of these presentations. As you add items to the list, your job becomes more difficult, but as you thoughtfully insert the same items into proper slots in the chart, your job becomes easier. That's the beauty of organization. It requires nothing more than a thoughtful approach in evaluating your own job, whether it be in the mine, shop, cleaning plant or strip pit.

And look! You have a recreation function built into your organization chart, and perhaps we could profitably spend a few minutes in developing this point a little further. Here's what we mean.

RECREATION ON THE JOB

A recent issue of *Management*, a bulletin for industrial supervisors published every other Friday by Kelly-Read & Co., Inc., contains an article entitled "Organize Your Responsibilities." The writer of the article points out that every supervisor has major responsibilities, including those which may be classified as routine, those which may be thought of as unusual or emergency duties and those which pertain to the supervisor's own favorite projects. In the last group are a number of projects relating to his work which the supervisor really enjoys thinking about and developing. Pursuing these studies is a change from routine and emergency responsibilities, the writer concludes.

That's recreation on the job, we contend. In your job on a coal-mining property, you have major responsibilities corresponding to the four numbered boxes in the chart. These are the things you must do. They are undodgeable requirements of your job. You must have some organized plan for handling these duties if you are to have any hope of including the unnumbered box, recreation, in your working-day schedule.

Note also the sequence in which the boxes are numbered from 1 to 4 in order of importance, as we see it. You'll not get gratifying results from the effort you expend on the duties in Box No. 4 if you skim over lightly the duties in the other three numbered boxes. Remember, in setting out to organize any endeavor you must place first things first.

ORGANIZING YOUR DUTIES

With that in mind, let's take a closer look at Box No. 1, headed Administrative. Under this heading we suggest you include all your paperwork. The prime purpose in doing this is to prevent these chores from hanging over your head. Recurrent paperwork is distasteful to many men, so don't feel guilty if it has a tendency to rub you the wrong way. Your best approach to the chore is to gather a list of such duties into one place, as was done here. This will result in a number of advantages, as follows:

1. You will see that your paperwork is not really frightening when you bring it into sharp focus like this.

2. You will find it easier to set up and follow a definite schedule for getting the paperwork done.

3. Your reports and communications will be neater and more complete since you will not be doing the work under tension nor in conflict with your other duties.

4. You will be better able to evaluate the relative merits of the various forms and perhaps suggest consolidation or elimination of some of them.

Let's go on to Box No. 2, Personnel. Here is a group of supervisory responsibilities which must be discharged before one attempts to supervise actual operations. Furthermore, a consideration of these personnel duties naturally follows the disposition of your "clerical" duties since some of your personnel functions may require a certain amount of paperwork.

This is an example of putting first things first. We give top billing to paperwork and personnel functions because we feel you should have these matters in order before you tackle seemingly more-important duties such as maintenance and operations.

Now consider Box No. 3, Maintenance. Here again is a list of duties, in reasonable arrangement, which must be satisfied before you can plunge into the operating phase with any real hope of success. You see, we are trying to analyze a mine supervisor's job with the aim of developing a set of suggestions that will permit him to reduce his lost motion and eliminate unnecessary excitement. Such excitement and lost motion limit a supervisor's effectiveness. On the other hand, thoughtful preparation of a job-organization chart frees him from these limits.

Box No. 4 contains a list of your final, undodgeable duties. Here is where you make your mark. Your operating responsibilities appear in this position in the chart because we feel that you can't really be most effective in operations until you have made prior plans for handling the duties in the other three boxes.

Planned paperwork is not burdensome.

Intelligent handling of personnel matters will be reflected in better performance at the front line of production. Please do not consider our use of the word personnel as some technical definition. We mean merely your man-to-man contacts with the fellows in your crew.

Maintenance is important because it becomes more vital to peak production with each increase in mechanization.

Your production record now should be reasonable because (1) your affairs are in order, (2) your men are ready, willing and able to do a good job and (3) your machines are ready to serve them.

BENEFITS OF ORGANIZATION

Do not infer from this organization chart that you clean up your paperwork in the first hour of your working day, your personnel functions in the second hour and so on. We all agree such a proposition is out of the question. This particular job organization deals mainly with organization of your thinking as you approach your job, and we know you will of course move back and forth among the various areas of the chart. You will have a base of operations in your own mind, however.

Now how about this matter of recreation on the company's time?

The duties in the four numbered boxes are your primary job. These are the responsibilities your employers expect you to discharge in an acceptable manner. They pay you for this. We are certain, however, there are no strings on you if you wish to go beyond these minimums, and it is beyond these minimums that the recreation areas lie.

Here is what we mean. If you do a good job of organizing your own supervisory effort, you will find that you operate under reduced pressure. Your thoughtful planning will result in fewer emergencies. Now you will be able to supervise at a regulated pace, and you you will find that you have time to think about ways to improve your operations.

For example, you may want to develop a better control scheme for the gathering pumps, or a better method for handling traction sand. You may want to give the new employees some extra time for their development. Such endeavors differ somewhat from your normal duties. They are a change of occupation, or recreation.

Your company management will be pleased if your recreation on the job results in suggestions and ideas that are worthwhile.

Your job-organization chart may not look like the one at the head of this piece. Yours would no doubt be directed more closely to your own personal needs. Try this exercise in job evaluation and see how it can be a real help in sharpening your performance.

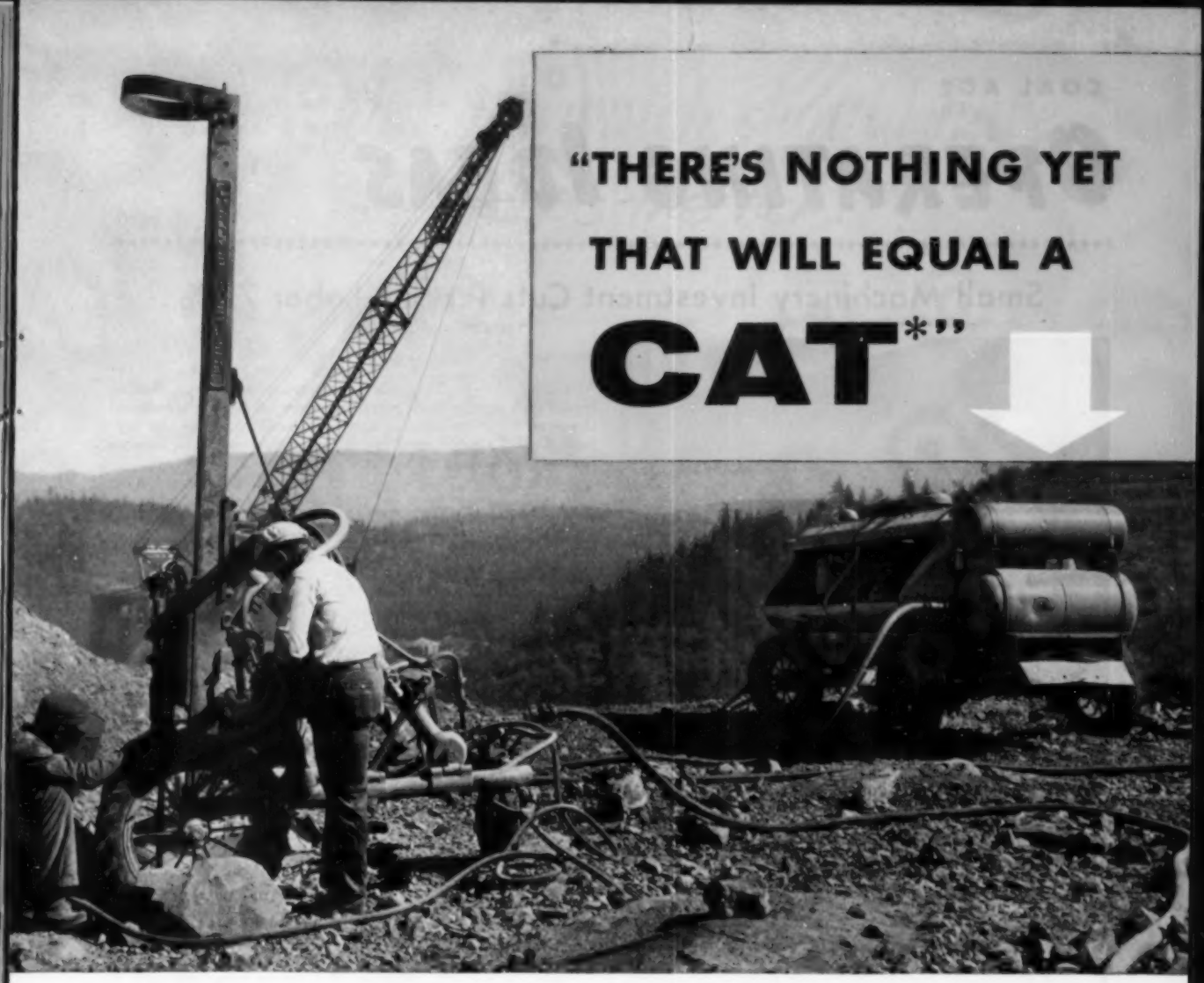
Lest You Forget

When you are trying to do your best,
Your safety post you must set.
For if in this you should fail,
You may not live to tell the tale.

You may be lucky once or twice,
But when you fail you've lost your life.
Then your thoughts and all your ways
Will be beneath the mire and clays.

There to awaken on the judgement day
Before the Lord and hear Him say,
Depart from Me, I know you not
Because your safety you forgot.

—Leonard Adams
Truax-Traer Coal Co.
Kayford, W. Va.



"THERE'S NOTHING YET THAT WILL EQUAL A CAT*"

Up in Ravensdale, Wash., this Gardner-Denver 500-foot compressor furnishes air for drilling hard clay overburden which is then blasted to get at the coal seam. On the job since 1950, its rugged Caterpillar D13000 Engine has never been overhauled!

Performance records like this are not unusual for Caterpillar Engines. Nor are comments like this one from Al DeCoria, job superintendent for J. A. Terteling & Sons, Inc.: "There's nothing yet that will equal a Cat."

On tough jobs like this one, the rugged construction and quality workmanship of Caterpillar products pay off. Such features as specially hardened crankshaft journals, long-lived aluminum alloy bearings and really *effective* engine filters and seals contribute to long and trouble-free work life.

Routine maintenance on Caterpillar Diesels is simple and easy. And, to cut costly down time, your Caterpillar Dealer stands ready with factory-trained service men and genuine Caterpillar replacement parts. Further cutting costs is the ability of all Cat Diesels to deliver full and foul-free power on non-premium No. 2 furnace oil, thanks to their exclusive Caterpillar-built fuel injection systems. This means a three-way saving: cheaper fuel, less fuel, reduced maintenance.

Leading manufacturers of excavators, compressors and other mining machinery can supply Caterpillar Engines in their equipment. And you can get replacement power from your Caterpillar Dealer. He will be glad to help you select the right size unit from Caterpillar's range of diesel engines and electric sets.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

SPECIFY CAT POWER FOR HIGH-PROFIT PERFORMANCE

OPERATING IDEAS

Small Machinery Investment Cuts Picking Labor 75%

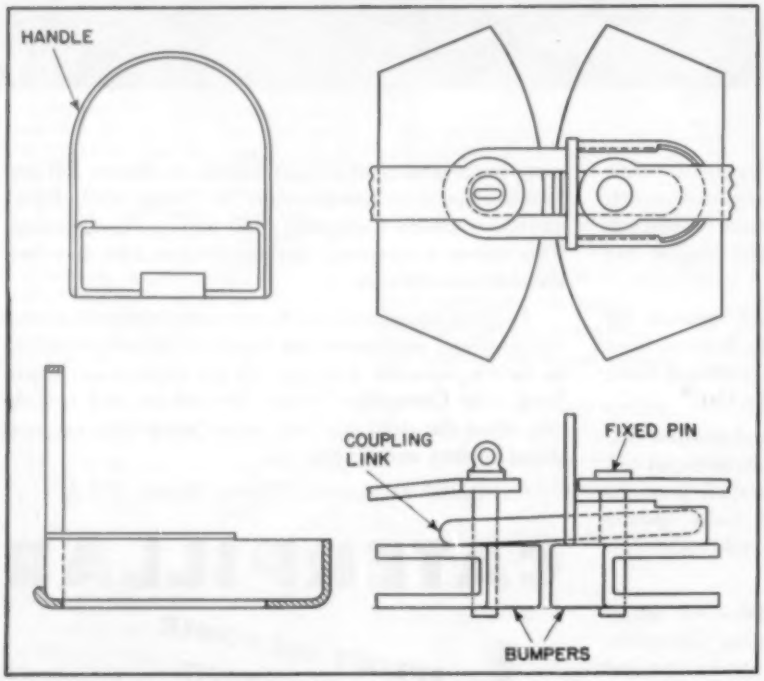
ADDING FOUR BARS as an extension to a reciprocating feeder and installing an apron conveyor 50 ft long eliminated the need for three slate pickers at Mine No. 1-C of the Amherst Coal Co., Amherstdale, W. Va. Now one man handles a job that formerly took four.

No. 1-C is a drift mine high on the hill. Full-seam mining with loading machines is the practice and the mine is equipped with a modern washing plant at the bottom of the hill. Coal is lowered by a rope-and-button conveyor.

To reach the rope-and-button unit, the coal travels 200 ft. on a level belt extending from the mine-car dumphouse. Originally, four men picked slate from the belt and tossed the material into chutes extending a short distance over the hillside.

On the reciprocating feeder moving the coal from the dump bin to the belt, scalping bars spaced 8 in apart now carry the large lumps of slate onto the apron conveyor, which discharges to the hillside refuse dump. As shown in the photo, the one picker, using a rake, keeps the bar section from clogging and picks out of the slate the few lumps of coal too large to pass between the bars.

Attachment Boosts Safety With Link-and-Pin Couplings

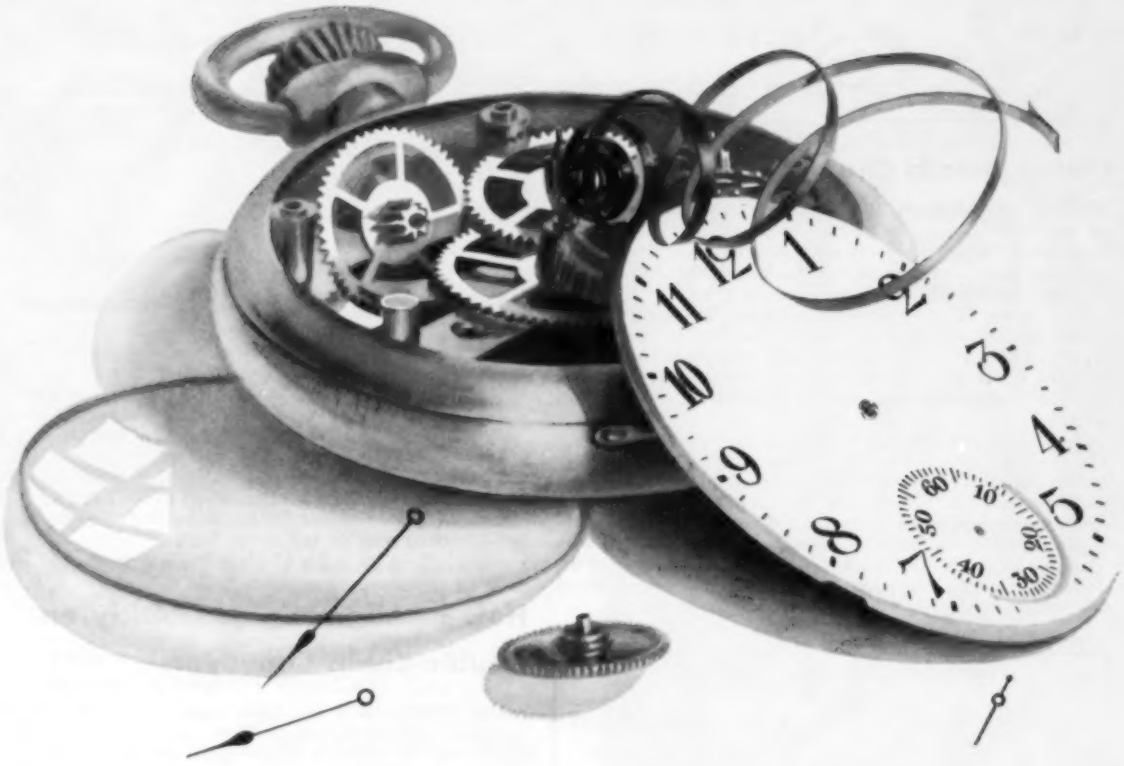


PATENTED CAR-COUPLING AID provides a handle for safely guiding the coupling link into proper position.

SAFER MINE-CAR COUPLING where link-and-pin couplings are used is the big benefit to be gained from the application of a recent invention of J. V. Berry, Johnstown, Pa., who was awarded a patent for his car-coupling apparatus by the U. S. Patent Office. The device consists of a cradle to hold the coupling link and a handle projecting upward from the cradle by which the cradle and its contained link may be safely guided into the coupling of the adjacent car.

As shown in the accompanying illustration, the apparatus is installed by (1) removing the fixed pin which holds the link in the coupling, (2) inserting the link into the cradle where it is securely held by the body of the cradle itself and a projecting tongue at the front of the cradle, (3) placing the new unit containing the link back into position between the drawbar and bumper of the car and (4) replacing the fixed pin down through the drawbar, link, cradle and bumper. Not more than 15 min should be required for the installation, and the result is that the coupling link is provided with a handle designed to keep the fingers and hands of car-couplers out of harm's way. A number of the units have been in service longer than a year and have been helpful in preventing damage to links as well as improving safety, Mr. Berry writes.

Everything a watch should have
—except the tick!



Your plant can't "tick" properly, either—without Correct Lubrication!

Like this watch, your plant may have all the right "parts"... the finest machines made... yet may not be "ticking"—running at top efficiency—because something is lacking. That "something" is called *Correct Lubrication!*

By Correct Lubrication we mean much more than just "oil" and "grease"—which any oil supplier can provide. We mean a detailed *program* of lubrication—designed specifically for your kind of machinery and type of operation.

Working with your personnel, we analyze all your machines and their operating conditions to determine their exact lubrication requirements. Then we recommend the *right* Gargoyle product for every moving part, advise on correct methods of application, set up proper lubrication schedules, follow up regularly with progress reports on benefits achieved.

In plant after plant, such a program has effectively boosted production—materially cut maintenance costs. It can do the same for you. Why accept less?

Socony-Vacuum

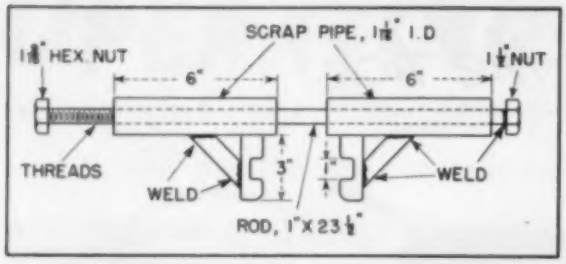
SOCONY-VACUUM

Correct Lubrication

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Four Ideas for Loader and Conveyor Maintenance

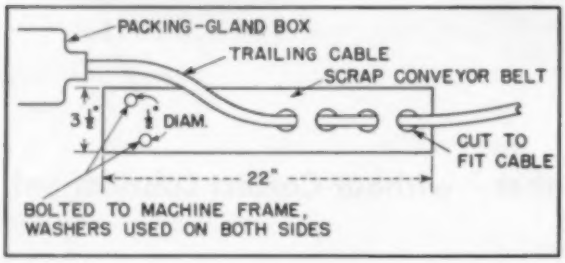


Clamp Speeds Chain Repair

MAKING WORK EASIER and decreasing the time required for various conveyor-chain repair jobs are the chief benefits from using this adjustable clamp. It works equally well for replacing broken or bent flights, for taking the slack out of the chain, or for releasing a fouled chain.

This is one of three devices developed by Harry Lanier, electrician, Summerlee mine, The New River Co., Summerlee, W. Va., to simplify maintenance and increase production by reducing down time. While they are used to service Jeffrey 61 CLR loaders, all three may be adapted for use on other units.

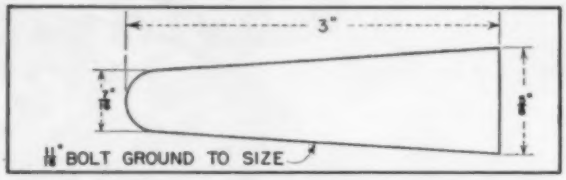
Here's how the unit can be used to release a fouled chain. The chain is cut on the top or carrying side of the loader boom and the clamp is connected to the two ends and tightened until the chain is freed. When used for the other repair jobs, the clamp is attached to the chain and tightened to hold the chain in place until a new flight has been inserted or a link has been taken out to shorten the chain. The two hook members of the clamp float on the threaded bar and thus can be positioned as desired.



Anchor Prevents Cable Pull-Out

To prevent loss of production resulting from trailing cables being pulled out of the packing-gland box on the loader, this easily made strap support was developed, Mr. Lanier reports. A piece of discarded rubber conveyor belt plus some ingenuity and about 15 min work were all that were required to make the support.

Two ½-in holes are cut at one end of the belt to fit the bolts that hold it securely to the loader frame. Four holes slightly larger than the trailing cable are cut in the opposite end of the belt and the cable is laced through them. When the cable is pulled, the force is transmitted to the belt and thence to the machine frame rather than to the packing box.



Tool Speeds Oil Seal Replacement

Replacing an oil seal in the control lever of the loader was a tough job until this simple tool was made from an 11/16-in bolt. Without this tool it was difficult to replace a seal and at times several seals were broken before one was successfully installed. Now one can be replaced without damage, Mr. Lanier points out.

When a seal is to be installed, it is slipped over the smaller end of the device and gradually moved to the larger end. The larger end is held against the controller shaft and the oil seal is then moved from the tool to the shaft.

How to Align Flights Quickly on Double-Chain Conveyors

MINE MECHANICS who have worked on loading machines equipped with double-chain flight conveyors sometimes are faced with the problem of realigning the flights because one of the chains jumped a tooth on the drive sprocket. Frank Murr, electrician, Jean Ann Coal Co., Logan, W. Va., can align the flights on a Goodman 360 or 460 loader in 10 to 15 min and offers his method to others who might have had the same problem.

Here's how the job is done. Add one link to the side of the chain that has jumped a tooth and run the chain for one revolution. If only one tooth has been jumped, the flights will be straight, but if more than one was passed over, the chain will have to be run more than one revolution. The rule to remember is that for each tooth missed, the chain must be run for one revolution. When the flights are straight, remove the extra link and reconnect the chain.

Hydraulic-Press Improvement Saves Time and Labor

ONE MAN now can easily and quickiy move the yoke of the 200-ton horizontal hydraulic press in the Omar (W. Va.) central shop of the West Virginia Coal & Coke Corp. Formerly, the job required two men and was somewhat tedious.

Equipment added to the press includes a 4-in wire rope, a drum 10 in in diameter, tail pulley, roller chain, countershaft and a reversible ratchet crank. The rope has four turns around the drum, enough for traction, and the haul and tail ends of the rope are fastened to a frame attached to the bottom of the yoke.

By reversing the ratchet and operating the crank the yoke can be moved either direction. Formerly it was moved by two men using pinch bars at top and bottom.

O-B Couplers Join on Curves *Without Missing!*

Extra Wide Gathering Range Helps Lengthen Your Car Life

- O-B Couplers offer 30% greater lateral gathering range when joining car on straight track with one on sharp curve.
- They allow as much as 5 inches vertical displacement of Coupler heads and still join upon first impact . . . in a second.
- Stay locked positively even when going over sharp knuckles, or into dips. Don't rub up and down against each other and wear. Never separate.

See your O-B representative about O-B Automatic Couplers' many other advantages. Give your mine cars a new lease on life.

Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

O-B Bail-Type Units Factory Assembled

To Speed Up Installations

Shells and Plugs Available in Both ¾" and ⅝" Sizes

- O-B Bail-Type Shells and Plugs offer you several patented features for faster, easier installation . . . advantages that were developed under severest mine-testing conditions over a period of several years.
- All units are factory-assembled with shells and plugs in correct relation to each other to fit into minimum size holes.
- Design of both ¾" and ⅝" units eliminates costs of upset ears on bolts or other auxiliary devices for supporting shell during installation.
- Holding power of both units exceeds breaking strength of bolts used. Maximum expansion also assures you improved holding power in soft material.

Ohio Brass

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IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

See special June, 1954, issue of Haulage Ways on O-B Bail-Type Shells and Plugs, their installation procedure and advantages.

O-B Taps Have Terminals to Fit Your Every Need

- If it's holding power you're after, choose the O-B H-1 Terminal. This design develops practically the ultimate strength of No. 1 cable which is 2200 pounds. For attachment, slide straight bare cable end into terminal and tighten two socket set screws.
- For easy installation, you can't beat O-B's H-2 Terminal. Just insert straight bare cable end into terminal and hammer down locking cam with rock or nearest heavy object. Has approximately same holding power as H-1 Terminal above.
- If you prefer a terminal that will let cable pull out before damaging connections at the machine, this H-3 Terminal is your choice. To attach, tighten bolt against washer bearing on the bare cable.

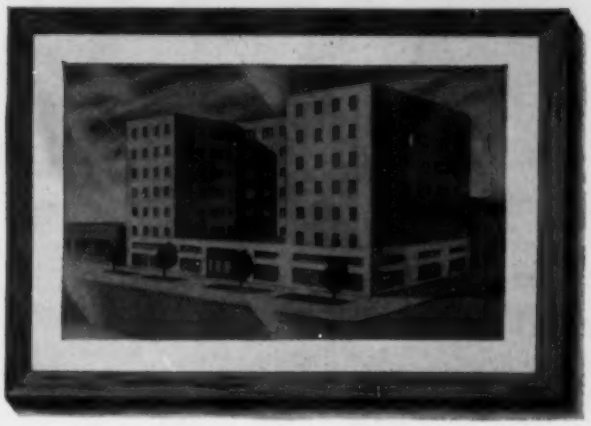
Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

Tap station in illustration is made from two O-B Clamp-Type Contacts with Rubber Handles (Catalog Number 22269) and pieces of trolley wire cut to size desired.



Whatever your fuel picture, *there's a B&O coal to fit it!*

• In the Baltimore & Ohio area lies a treasure-land of Bituminous—an almost inexhaustible source of low-cost heat and energy. Here are found Bituminous coals *of all varieties*—for power, for coking, for steam, for space heating.

B&O coals are excellent for generating steam in utility and industrial power plants, for steel mills, malleable iron plants, gas plants, lime and brick kilns, cement and glass plants, and potteries.

Whatever your "burning need," Industrial or Domestic, there's a B&O coal to meet it—and we are ready to help you find the best for your purpose. Just *ask our man!*

BITUMINOUS COALS FOR EVERY PURPOSE

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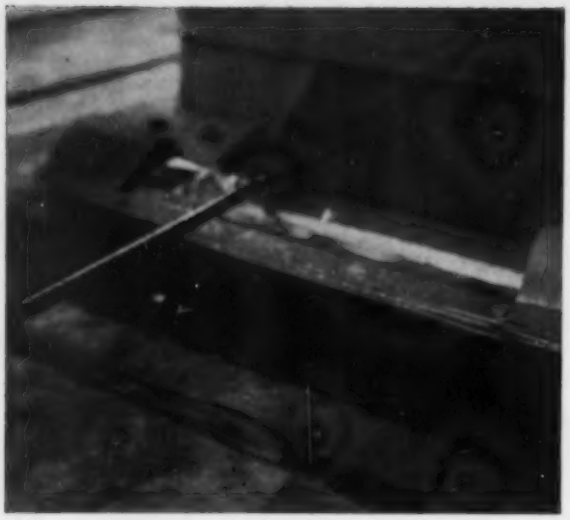


Roller-Type Lubricator Doubles Wire-Rope Life

AS A RESULT of the recent installation of a simply designed lubricator, double the life is expected of the wire rope used to shift barges at the barge-loading facilities of the Truax-Traer Coal Co., on the Ohio River at Ceredo, W. Va.

The new device deposits a small amount of lubricant onto the wire rope, which is ⅝ in in diameter, as it winds on and off the hoist drum. In operation, a 4-in-diameter roller mounted adjacent to the drum, with its bottom half dipping in oil, is contacted lightly by the rope. The oil container is one-half of a 6-in pipe. Neoprene rubber strips along each side and extending almost to the top of the roller keep out dirt and rain and also wipe excess oil from the roller and rope.

In this service the rope gets into the river frequently and rusting usually limited its life to about 4 mo. The present rope, operated with the lubricator, has served much longer than that and still appears to be in very good condition. A. N. Nolen, boat operator for the coal company, suggested and devised the lubricator.

Reflecting Plumb Bob Speeds Surveying

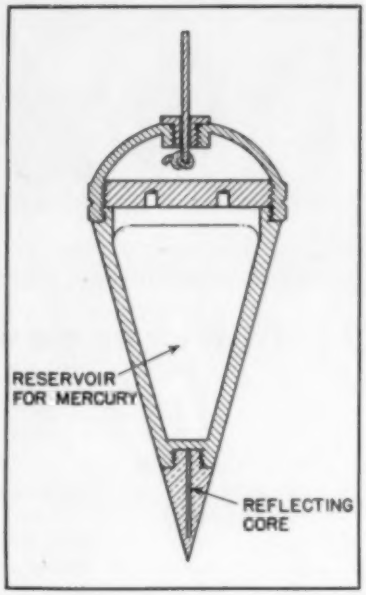
FASTER AND EASIER mine surveying are possible, reports Cordell Damron, Yeager, Ky., with a patented light-reflecting plumb bob he has developed. Using the bob, the inventor says, a transitman can take a backsight, without the aid of a rodman and can establish points for extending lines without the rodman removing his caplamp.

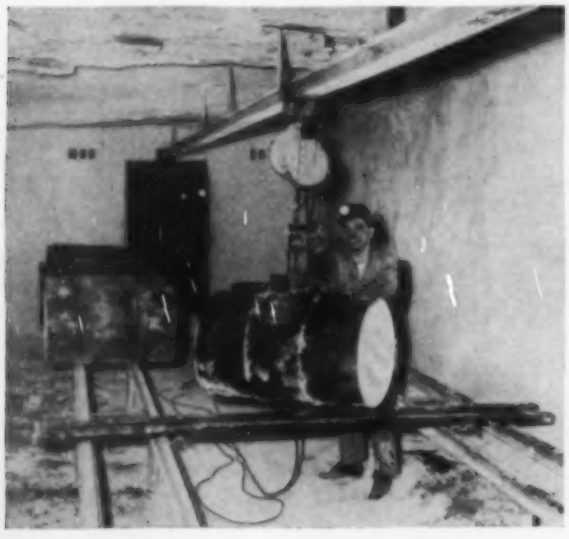
Key to the light-reflecting unit is a transparent tip which has a small core filled with phosphorescent material. When the transitman looks through his telescope, he can see the luminous core and align the vertical crosshair with it without additional light from a cap lamp. The core is precisely drilled to be in line with the cord of the suspended bob, and therefore sighting on it is as accurate as centering on the point of the bob or on the plumb bob cord.

Here's how a survey team would use the bob to speed surveying, as outlined by Mr. Damron. As they pass the backsight, one of the plumb bobs is hung in the station spad and the transitman moves ahead and sets up under the last station. He takes his backsight without the aid of the rodman. At the same time, the rodman moves ahead to the approximate sight for the new station and is ready to be lined in as soon as the instrumentman has his backsight. It is not necessary for the rodman to remove his cap lamp to cast light on the bob because the instrumentman can see the luminous core in the point. When the bob is on line, the rodman immediately can begin drilling the hole because he needn't replace his lamp.

In addition to the light-reflecting points, the bobs can be made with a hollow body that can be filled with mercury when a heavy unit is needed in strong air currents.

Considerable interest has been shown in the new bob and although they are not now being manufactured, Mr. Damron expects to have his invention on the market sometime in the future.





Oil-Storage Room Features Monorail for Easy Handling

STREAMLINED HANDLING METHODS for heavy oil drums at Mine No. 10, Peabody Coal Co., Pawnee, Ill., permit one man to perform underground storage and issue of hydraulic and lubricating oils without undue labor. Main feature of the system is a monorail extending from the supply track to the back of the storage room and supporting an electric-powered 1-ton Yale hoist. The monorail and storage racks are made of mine rail, as shown, while a cross-ramp, which may be moved along the racks to any position, is made of two lengths of pipe welded to short pieces of steel crossties. Using a drum sling on the hoist, the operator lifts the drums from cars on the supply track and moves them into the fireproof storage room with minimum effort.

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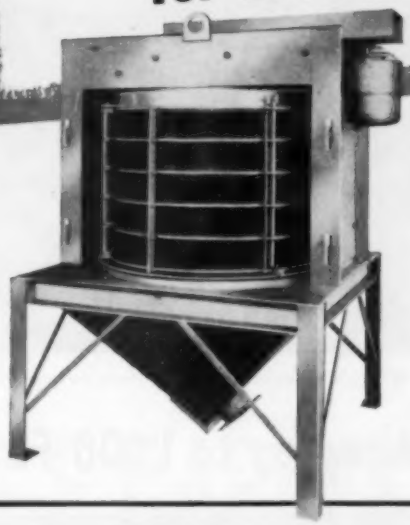
for BETTER COAL PREPARATION



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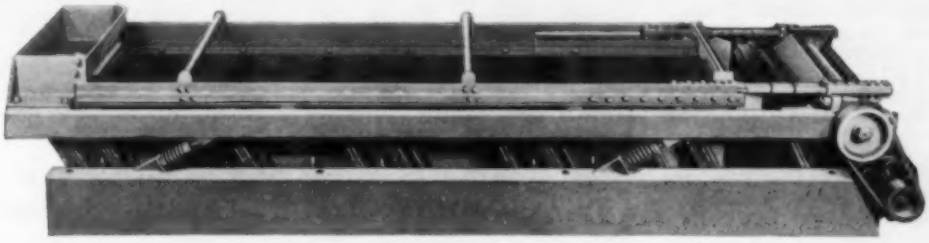

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S154

COAL AGE

EQUIPMENT NEWS

BRIDGE CONVEYOR connects miner to extensible belt.

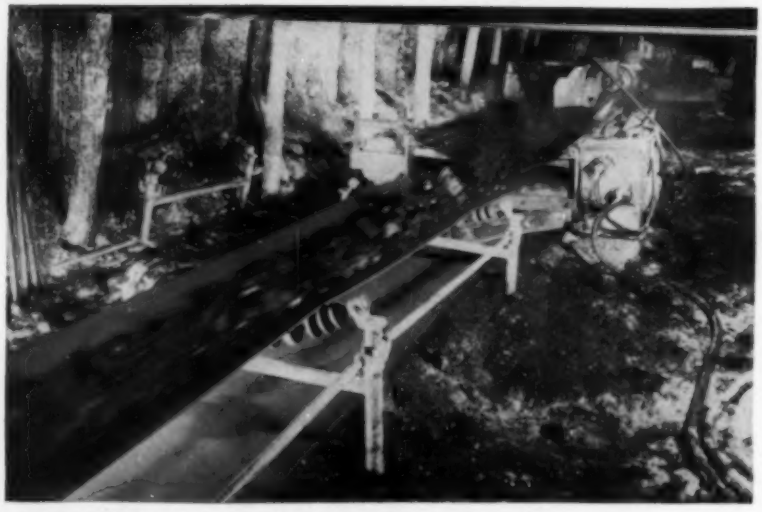
DRIVE SECTION of extensible belt loads to mother belt.

Extensible Belt Serves Continuous Miners up to 1,000 Ft (1)

A practical long-distance continuous-haulage system to provide uninterrupted transportation from continuous-mining machines in driving rooms and entries up to 1,000 ft, including breakthroughs and pillar extraction, was announced last month by the Joy Mfg. Co., Pittsburgh 22. The system utilizes the first production model of the Joy extensible belt conveyor shown at the 1953 Coal Show, plus a new bridge conveyor—a flexible connecting link between the belt and the continuous miner—and the new 2-bearing Joy "Limberoller."

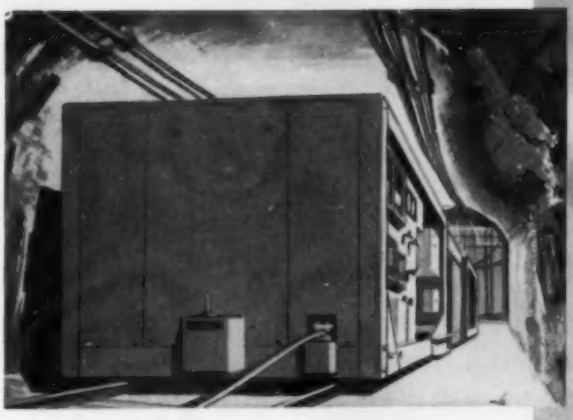
The extensible belt consists of two main units, both crawler-mounted: (1) a driving section provided with a tandem drive and multiple-loop takeup, automatically tensioned, with a storage capacity of 100 ft of belt; and (2) a tail section that moves with miner and extends the conveyor. Lightweight portable idler stands are added to the moving belt as needed and belt tension, alignment and slippage control are automatic. Operating under full load, the belt extends or retracts 50 ft, and new belt sections 100 ft long can be added in 5 min to permit another 50 ft of advance, the company reports.

The one-piece bridge conveyor, equipped with a self-powered belt drive, is flexibly suspended from the miner to permit a 75-deg swing to either side, and at its discharge end is flexibly supported by a track-mounted carriage with 10-ft travel resting on the tail section of the extensible belt to provide a 75-deg swing and telescoping action at that point. Thus, the bridge conveyor is automatically positioned to provide a continuous, uninterrupted flow of coal between the miner and the extensible belt.



CONTINUOUS HAULAGE UP TO 1,000 FT—Extensible belt connected by a new-type bridge conveyor to continuous-mining machine advancing 16-ft-wide rooms. New-type idlers and simple lightweight idler stands are important features of new system.

The extensible-belt system can be completely dismantled at a worked-out location, moved and set up again ready for operation in approximately 1¾ hr, a performance proven in actual mine operation where 600-ft rooms are being driven, the maker reports. The extensible belt is available in 24-, 30- and 36-in belt widths; 15, 25 and 40 hp, AC or DC, permissible construction; and ratings of 180, 280 and 440 tph. Belt speed is 425 fpm. Bridge conveyors are available in belt widths, speeds and ratings to match the extensible-belt models. For Bulletin J-303 with full information from Joy, circle No. 1 on the postage-free card facing p 132.



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will give you a dependable power supply

When electric cables have to be pulled through water and ice, across sharp rocks, or dragged behind machines, it is important that they be designed to withstand this treatment. Stationary equipment, too, requires a dependable power supply. G-E mining cables have been specifically engineered for the severe operating conditions of the mining industry. Because there's a G-E mine cable designed for each mining job, you can select the proper cable to give longer service for your particular application.

General Electric has prepared a comprehensive catalog of its wire and cable line for the mining industry. You'll find detailed descriptions of power cable, portable cable, aerial cable, drill cord, locomotive cable, control cable, shot firing cord, telephone cable, and magnet wire. In addition, the catalog contains many helpful diagrams and suggestions for proper wiring techniques. Fill in the coupon at the right for your copy.

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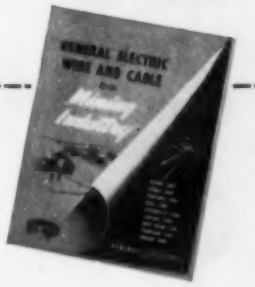

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Please send a free copy of "General Electric Wire And Cable for the Mining Industry."

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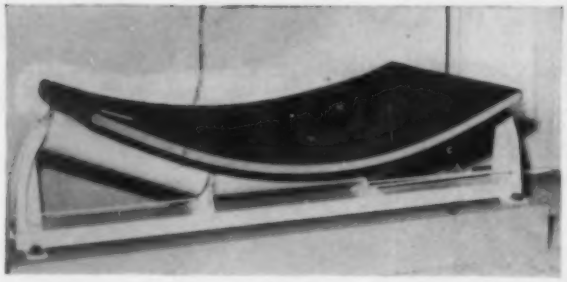
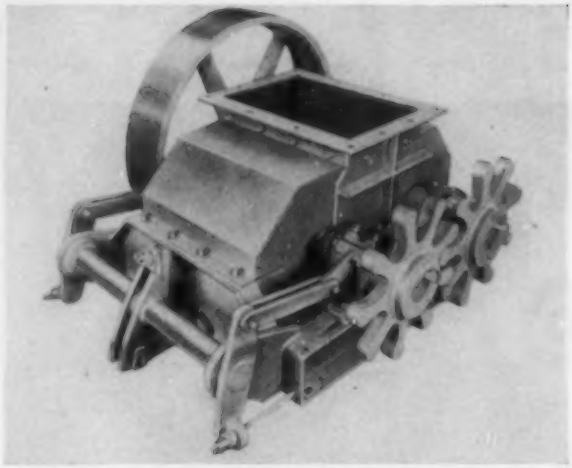


High-Strength Belt for Long Hauls (2)

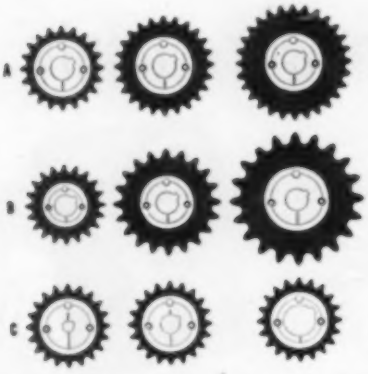
New super-strength conveyor belt, announced last month by the United States Rubber Co., New York 20, will permit hauling 1,000 tph of coal on one continuous 42-in belt operating at 600 fpm distance of 3 mi underground without transfer, a mile longer than any underground belt conveyor in existence, the maker reports. The new "Super Ustex-Nylon" belt utilizes a new type of cellulosic yarn treated chemically to give it exceptional strength and is three times stronger than any rayon belt fabric and 3½ times stronger than any cotton duck used in belts today, the company says. Combining the cellulosic yarn for the longitudinal member and nylon for the crosswise fabric provides high strength, ability to absorb loading shocks and greater flexibility for better training. On a 42-in-wide slope conveyor handling 1,000 tph, the belt would permit vertical lifts in excess of 800 ft, and it would be possible to build a slope conveyor utilizing a 72-in Super Ustex-Nylon belt requiring a 2,500-hp drive, the company states. Folder with details from U. S. Rubber.

FOR A CONVENIENT CHECKLIST, tear out the postage-free card facing p 132 now. Then as you go through this section, circle the numbers of the items that interest you.



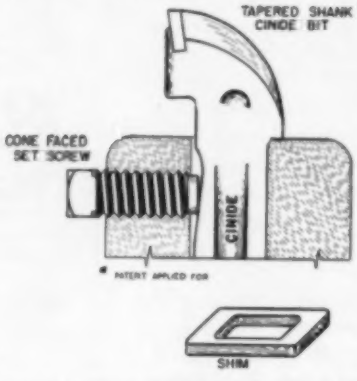
Double-Roll Crusher for Accurate Sizing (3)

Development of its Black Diamond double-roll crusher as a relatively inexpensive unit for the reduction of coal has been announced by the McLanahan & Stone Corp., Hollidaysburg, Pa. Available for processing a range of feed sizes, the unit is offered with roll diameters of 18, 24, 30 and 36 in and roll lengths from 18 to 60 in. Features cited by the maker include a movable roll backed by a special linkage system incorporating a curved cast-iron adjusting block that serves as a combination tramp-iron protective and adjustment device. The blocks are designed to break on entry of non-crushable material. Solid backing of the movable rolls provides a fixed non-fluctuating opening between crusher rolls to permit accurate sizing of product and special gears facilitate a wide adjustment of openings up to 3½ in. Details from company.



SPROCKET LINE EXTENDED (4)

Extension of its "off-the-shelf" line of Taper-Lock sprockets to include 1⅛-, 1¾- and 2-in pitch sizes has been announced by the Dodge Mfg. Corp., Mishawaka, Ind. Users of single-strand roller chain now can secure sprockets and bushings for chain sizes 40 through 160 direct from distributors' stock ready for immediate installation without delay for reboring, keyseating, drilling and tapping. In addition to mounting on a shaft easily and quickly with the firmness of a shrunk-on fit, Taper Lock sprockets may be easily removed and bushings reused. Their flexibility for a wide range of applications is shown in the examples above of: (A) various sprockets on a given shaft with the same Taper-Lock bushings; (B) range of sprockets fitting the same shaft greatly increased by using different bushings with the same bore; and (C) one size of sprocket applied to different-sized shafts by using stock bushings with different bores. Bulletin with full details on all sizes offered by Dodge.



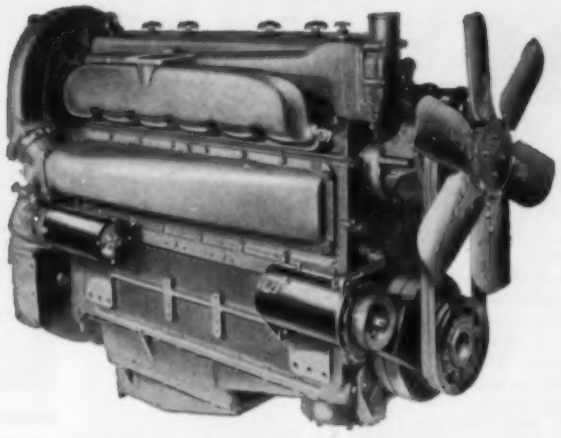
BIT DESIGN PROLONGS LIFE (5)

The new Cincinnati method of clamping "Cinide" bits, designed particularly for continuous-mining machines where holding an ordinary bit is very difficult, was developed to minimize loss of bits, increase set-screw life and thus lower cutting costs, the maker reports. The slight angle of the cone on the set screw coincides with the front angle of the tapered bit shank to provide a wedging action that prevents upward movement and in effect locks the bit in place. By eliminating the need for the set screw penetrating the bit shank, the Cinide bit can be made harder and tougher for longer bit service, and set-screw life is increased because shattering and mushrooming of the clamping face no longer occurs, the company says. The clamping method may be employed wherever conventional tungsten-carbide bits are used and the tapered-shank Cinide bit can be furnished in any type of bit and style of tungsten-carbide tip. Where bit gage must be accurately maintained, insertion of the bit shank in an inexpensive, easy-to-use shim will provide for the bit always shouldering solidly, it is pointed out. Bulletin from Cincinnati Mine Machinery Co., Cincinnati 25, Ohio.

TUBELESS TIRE (5A)

New "Mitco" industrial-type tires are constructed of highest-quality rubber and

NOW 300 HORSEPOWER



in GM "6-110" diesel engine

Improved Design Gives Still More Power Per Pound From Same Size Unit

Want more power—and production—from your heavy-duty equipment?

Stymied because you can't fit a higher-horsepower Diesel into your units?

Now you can get the power you need—and the increased production you want—with a new 300-horsepower General Motors "110" Diesel—the engine that delivers more torque in the working range. And, you can get them with no increase in engine size or weight.

Higher horsepower means faster operating speeds—high torque means more working power—for operators of all kinds of heavy-duty units.

In off-highway trucks this combination means better hill-climbing, more trips per day, bigger pay loads.

In shovels it means faster digging and loading, more yardage, lower maintenance costs.

In drilling rigs it means more hole per day, faster round trips.

In tractors it means more power for pulling, pushing or "dozing."

Get full details on the new, more powerful GM Series 110 Diesels from your GM Diesel distributor. Have him show you that GM Diesels cost less to buy, less to run and less to maintain than any other Diesel.

New "Figure 8" cylinder liner design gives freer "breathing," better fuel-air mixing for more complete combustion and higher engine efficiency.

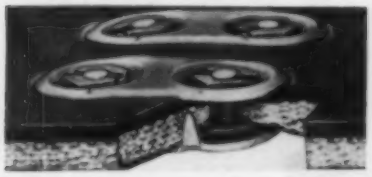
New high-valve long-life unit injectors meter precise amount of fuel needed to meet load demand. Other engineering improvements include full-flow oil filters,* new idler gear mounting, new injector linkage, higher engine speeds.

*optional

GM GENERAL MOTORS DIESEL POWER

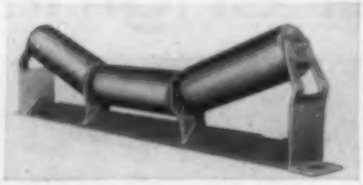
DETROIT DIESEL
ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 300 H.P. Multiple Units . . . Up to 864 H.P.

fabric pads fastened together under extreme pressure with an internal steel core, the maker says. In addition to eliminating the possibility of punctures and blowouts, the tubeless tires offer easier, more accurate steering, superior traction, load capacity equal to the heaviest-ply pneumatic tire and resiliency comparing favorably with that of a pneumatic tire, the company reports. Folder with full details on a range of sizes available for mine and other applications is offered by Mitchell Industrial Tire Co., Inc., Box 468, Chattanooga, Tenn.



BELT FASTENERS (6)

New Flexco belt fastener was developed for joining conveyor belts with which scrapers or plows are used and is so designed that the scrapers readily ride over it, with the result that there is less wear on the scraper and improved cleaning of the belts, the maker reports. The Flexco scraper plates are made in one size for joining belts 5/16 to ⅛ in. thick, in steel, Monel and Everdur. Bulletin F-108 with details from Flexible Steel Lacing Co., Chicago 44.



LOW-COST BELT CARRIER (7)

Its new SP-745 belt-conveyor carrier is a low-cost unit with a number of unusual design features typical of costlier units, according to the maker. The 4-in-diameter rollers have spun ends and turn on precision ball bearings, which are permanently protected with non-corrosive die-cast labyrinth seals. The carrier rolls can be operated on a "lubricated for life" basis or provided with grease fittings. Frames are of jig-welded steel, with formed steel brackets and inverted angle base designed to prevent buildup of dust and dirt. Available from stock for 18-, 24-, 30- and 36-in belts. Bulletin 554 with details from Stephens-Adamson Mfg. Co., Aurora, Ill.

NEW WIRE-ROPE SPLICE (8)

With a new wire-rope pressing system announced by Jones & Laughlin Steel Corp., Pittsburgh 30, a worker can make 20 to 30 splices an hour, compared to six or seven conventional splices for a skilled worker using hand methods, the company reports. Called "Jalkamp," the system employs an aluminum-alloy clamp or sleeve that is squeezed around the wire rope in a special 300-ton hydraulic press as a mechanical method of splicing eyes, with or without thimbles, in the ends of wire rope. The "splice" gives 100% of the breaking strength of the rope itself, saves 85% of the rope length needed for a hand splice and provides a pressed joint without damage to the individual wires, it is said. J.&L. is exclusive distributor of the Swedish-made clamps and presses in the U. S. and is currently leasing presses to apply this type terminal to wire rope up to ¾ in. Details from company.

HIGH-PRESSURE AIR HOSE (9)

Service possibilities of its new "Commander" wire-braid heavy-duty air hose is indicated in the test shown above, the B. F. Goodrich Co., Akron, Ohio, reports. When run over by a freight-car wheel, the hose retained its full pressure of 400 psi and was not cut, damaged or permanently distorted. Designed for severe service in mines and other industries where high pressures are required or severe abrasion is involved, Commander air hose is extremely flexible and has an oil-resistant hose tube to permit oiling tools through the hose, it is said.

CRAWLER TRACKS FOR TIRES (10)

The Galanot "Tire-Track," a device comparable to a crawler mount, provides a maximum of flotation and tractive effort under the most extreme weather and soil conditions for almost all types of rubber-tired vehicles, the maker reports. Designed for tires ranging from 6:00x15 to 18:00x26 and built with variable shoe lengths and versatile chain arrangements, the Tire-Tracks can be applied to dual or single tires on either single or tandem axles and will handle from light loads up to gross loads of 60,000 lb. Two men can install them in an average of ½ hr., depending on the size of the vehicle. Details from Union Chain & Mfg. Co., Sandusky, Ohio.

NEW-TYPE DRIVE (11)

Featured by the maker as a new concept of power transmission, the Raybestos-Manhattan "Poly-V Drive" is a single, endless rubber belt with series of parallel V-ribs molded lengthwise around the inside and an uninterrupted high-strength member of synthetic cords across its entire width. The Poly-V sheave grooves are designed to mate precisely with the belt ribs and the load is distributed equally over the entire driving surface, thus providing twice the contact area of comparable multiple V-belt applications and up to 50% greater horsepower with the same width or equal horsepower with one-third less sheave width, it is said. Eliminating belt-matching problems common to multiple V-belts and offering economy in belt and sheave inventories, according to the maker, Poly-V is available in two cross-sections which meet all drive requirements from 3-in pitch diameter sheaves and 50-in belt pitch lengths upwards. Bulletin 6638 with details from Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J.

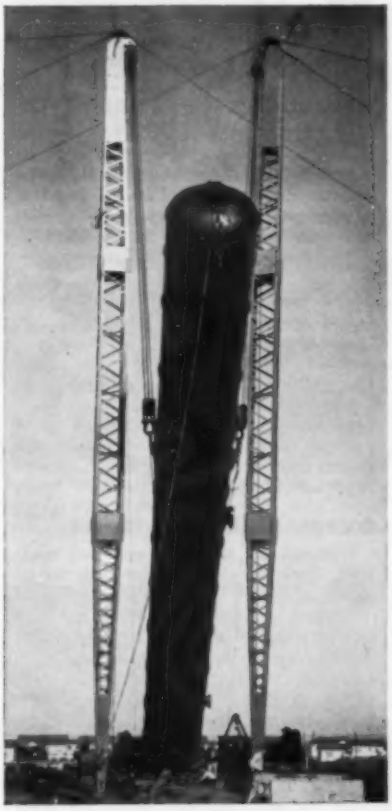
PROTECTIVE COATINGS (12)

New "Magic-Vulc" coatings embodying polyvinyl-chloride plastic as the basic ingredient, recently developed for pro-

Multiple-part Red-Strand Slings are always trusted to handle heavy loads. They are easy to apply to both the load and the crane hook. User tests in Detroit proved Red-Strand slings withstood unusual abuse, yet maintained higher-than-rated strength.

A Gary plant uses Red-Strand single-part slings for many lifting jobs like this. These slings are available with various combinations of end fittings for attaching the sling to rings or lugs. Single-part slings frequently are the most economical to use.

How to Select the Correct Sling for Your Job



A heavy cylindrical load like this usually calls for the use of multiple-part Red-Strand Flat-Laced slings. They are strong, flexible and do not slip or abrade on smooth round surfaces.

Start your sling selection by analyzing five factors:

1. The load—its size, weight, shape, finish.
2. Working area, amount of head room.
3. Size and type of crane hook.
4. Angle of sling legs.
5. Location and type of lugs or rings, if any.

This is basic information. From it, your supplier can recommend the sling by type, size and length that is safest, longest lasting and most economical for your job.

Types of Slings

Multiple-part slings are always recommended for heavy duty service, because for equal strength they are far more flexible than single-part slings. They hug the shape of the load easily, present a greater bearing surface to the load, and reduce the possibility of marring finely finished surfaces.

Where these factors are not so important, either Red-Strand ***single-part slings*** or ***grommet slings*** may be used for economy. Single-part Red-Strand slings are often recommended for lifting lighter weight objects, or those that have fixed attaching rings or lugs. Grommet, or continuous strand Red-Strand slings are ideal for forming hitches of various types without fittings.

How to Gain Extra Savings

Two suggestions will help you save money on slings.

Re-useable Pin-Lock thimbles reduce sling costs by 21%

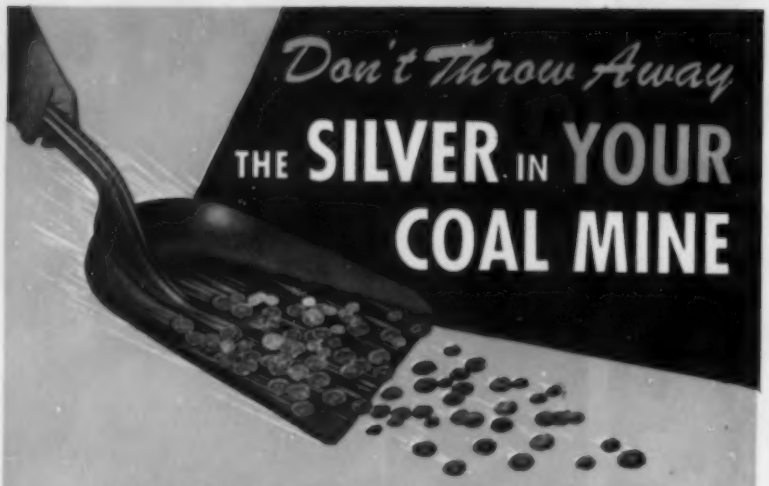
The first is to re-use Pin-Lock thimbles on multiple part slings. They increase sling life by protecting loops from abuse or damage. Besides, these exclusive Leschen Pin-Lock thimbles cut sling costs on an average of 21% because they may be used again and again. They lock into sling loops with pins instead of permanent clamps, permitting re-use, and eliminating constant expense of thimble replacements.

The second suggestion is to use Red-Strand slings—for a very simple but good reason: Red-Strand slings are made of ***higher-than-rated*** quality Leschen wire rope that delivers ***longer-than-expected*** service.

Get a copy of Leschen's ***Sling Handbook*** for complete information. Ask your Leschen man for one, or write.

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE



Don't Throw Away

THE SILVER IN YOUR COAL MINE

SAVE UP TO 25¢ PER TON WITH

OSMOSE

TREATED MINE TIMBERS

The timbers in your mine represent plenty of "silver" when you consider that this one item represents 40% to 60% of your supply bill. If you let timbers ROT, you might just as well throw away a shovelful of your hard earned profits every day in the week. We can cut your maintenance cost by making mine timbers LAST LONGER. You save on timber! You save on replacement! With Osmose you can make ANY wood species, even beech, gum, hickory, ash, elm and maple, into long lasting timbers.

WHY

DO THE NATION'S LEADING COAL MINING COMPANIES USE OSMOSE *Treated* TIMBERS?

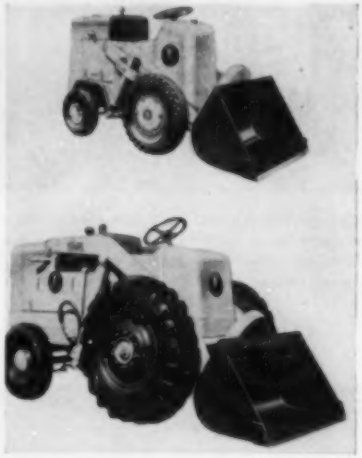
Here's a report from:

THE COLORADO FUEL AND IRON CORPORATION
PUEBLO, COLORADO

"We have been using Osmose for preserving our timbers in the coal mines since 1940. The timber has stood up without decaying since that time, particularly in places where we can use it in cap pieces."

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.
980 ELLICOTT STREET • BUFFALO 9, N. Y.
Representatives in Pittsburgh, Denver, Birmingham, Ala., Charleston, W. Va. and Harlan, Ky.

tection of industrial equipment from abrasion and corrosion, are easy to apply by brush, spray gun or dipping on metal, wood, concrete, fabric and other surfaces, the maker says. Drying to tough flexible finishes, the Magic-Vulc coatings are available in two types: coatings of vinyl resin-pigment-solvent systems and coatings of vinyl plasticol. The coating on the inside of fume-duct sections illustrated, which carry fumes of highly corrosive chemicals, will last for several years, as compared with only 6 mo for ordinary acid-resistant coatings, the company reports. Full details from the Magic Chemical Co., Brockton 2, Mass.



TORQUE-CONVERTER DRIVES (13)

The Frank G. Hough Co., Libertyville, Ill., has introduced new models of its HA and HAH front-end shovel-loaders with torque-converter drive as standard equipment. Advantages cited by the maker include a substantial reduction in gear-shifting and clutching and in concentration required of the driver, which permit faster cycles and a higher sustained output. Also equipped with power steering, Model HAH has a full-reversing transmission with four speed ranges from 0 to 23 mph, a "pay-load" capacity of 24 cu ft and a "struck-load" capacity of 18 cu ft. Model HA has a 2-speed full-reversing transmission with speeds from 0 to 11 mph and capacities of 16 and 12 cu ft, respectively.

ONE-MAN CAR SHAKER (14)

National car shaker is one-man operated, does not require the man to go under or into the car and provides rapid unloading of the entire hopper car with one attachment of the unit. The shaker is hung on the side of the car and then clamped to the underframe at the car's center. Powered by a Reliance Electric & Engineering motor with a high vibration-tolerance factor, the shaker generates intense vibrations that can empty an entire car in about 2 min, depending on conditions, the maker says. Installing the shaker requires slightly less than 5 min and, the company suggests, may be handled in three ways: with a special wheeled cart that may be easily moved from track to track; from a monorail for

Farbizo Coal Co., Dover, Ohio

2 Years Old!...16,280 Hours!...No Repairs! ...Oil Consumption Unchanged! With Cities Service DC-330 Oil

ONE OF FARBIZO'S GRADALLS has done an outstanding job on a 38 core slag pit. Cities Service DC-300 oil keeps Farbizo's hard-working Gradall shovel in top shape.

IN THEIR TD 24 BULLDOZER TOO, Farbizo relies on heavy duty, high detergent Cities Service DC-300 oil. Heat-resistant, long-lasting and free-flowing DC-300 does the finest job possible.

Twin G.M.C. Diesels in Marion Shovel Give Outstanding Performance!

Here's the story from the Farbizo Coal Co.:

"Following are the pertinent facts with reference to the Marion 111 M Shovel using DC-330 Oil since January, 1951:

"Developed ample power with TWIN G.M.C. Diesels operating at 1550 R.P.M. Operated 16,280 hours with no motor breakage or repairs. Mined 203,000 tons of #5 coal from 36" seam with an average over burden of 35 feet hard pan shale with streaks of iron ore bands.

"Oil consumption 1 pint per week, oil and filters changed weekly. Consumption is same as when shovel was new. Motors were recently inspected but no repairs or replacements needed. Unusual performance praised by G.M.C. and Marion Shovel representatives.

"Similar results using DC-300 Oil in two Gradall shovels and International TD 24 Bulldozer."

Let Cities Service lubricants protect the important investment you have in your machinery. Call your nearest Cities Service representative or write Cities Service Oil Co., Sixty Wall Tower, New York 5, New York.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

NEFF & FRY
SILOS
FOR COAL MINE USE

Many Neff & Fry Silos are used at coal mines for stand-by or surge-bin purposes. Coal from mine mouths is conveyed to silos for withdrawal to railroad cars, trucks, or processing plants. If the flow of coal is halted for any reason, it can accumulate in the silos, thus averting a stoppage of operations.

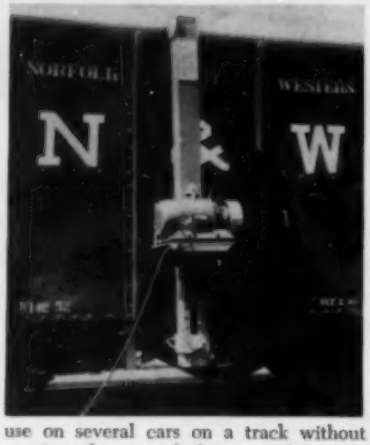
Neff & Fry Silos are admirably adapted for the purpose because of their stamina and longevity. The Super-Concrete Staves have rock-like strength and endurance. They survive the battering incidental to coal movement.

A Neff & Fry Silo can be dismantled and erected in another location, which frequently is a contingency in coal mine usage.

These are a few facts which should arouse your curiosity for further information. We'll be glad to send you literature and data—without obligation, of course.

THE NEFF & FRY CO.
228 ELM ST. • CAMDEN, OHIO

NEFF & FRY
SUPER-CONCRETE STAVE
STORAGE BINS



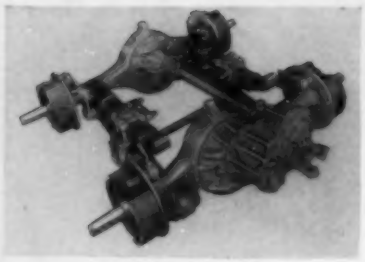
use on several cars on a track without moving them; and from a jib crane. Bulletin with details from the National Conveyor & Supply Co., Chicago 24.

ROLL-TYPE AIR FILTER (15)

The AAF "Roll-O-Matic" is an automatic self-cleaning air filter introducing a new type of glass-fiber filtering media and specially designed for commercial and industrial ventilating systems to clean both outside and recirculated air. The fiber-glass material supplied in 70-ft rolls is moved automatically on a continuous screen rotating in accordance with the quantities of dust collected and then is rerolled at the bottom of the unit after collecting its dust load. While for handling the material is basically a dry filtering media, its performance characteristics are those of a viscous air filter, the maker says. The Roll-O-Matic is made in sections 3, 4 and 5 ft wide and from 5 to 15 high, and one drive mechanism will operate from three to six sections. Bulletin 248 with details from American Air Filter Co., Louisville 8, Ky.

TANDEM AXLE (16)

New Eaton Model 32M tandem axle, with a load capacity of 32,000 lb on the rear tires at the ground, bridges the gap between present models of 28,000- and 36,000-lb capacity and meets the legal maximum in 37 states, the maker reports. Designed to provide vehicles with the advantage of maximum traction under unfavorable road conditions, the Eaton tandem axle features a third inter-axle differential in the power divider that



assures equalized power transmission to the driving wheels even though wheel speeds may vary because of road irregularities or differences in tire diameters. Details from Eaton Mfg. Co., Cleveland, Ohio.

ECONOMICAL POWER UNIT (17)

The mightiest concentration of power per cubic inch of displacement in its weight and size class is available in Ford's new 172-cu in 4-cylinder industrial engine developing 61 br-hp at 2,800 rpm, the company says. Less displacement normally requires less gas, for greater daily operating economy, Ford points out. Featuring the most modern large-bore, short-stroke, low-friction overhead-valve design, the "172" engine has been engineered, built and tested extensively for industrial applications, it is said. Details from the Ford Div., Ford Motor Co., Dearborn, Mich.

DUMP BODIES, HOISTS (18)

New line of "Strong-Arm" standard-duty arm-type dump hoists, announced

"Cleans up the job by itself"

BUILDING ROADS and stripping overburden make up the regular work of this powerful outfit owned by Knife River Coal Mining Co., at their Beulah, N. D. property. But here it is leveling an area for a new truck turn-around, one of the many other jobs the owners find for it.

"Big Red"—the INTERNATIONAL TD-24—saves a lot of blasting for Knife River Coal Mining Co. "and we haven't found a limit to the uses for it," says superintendent

Knife River uses its INTERNATIONAL TD-24 primarily for road building and stripping overburden near Beulah, N. D.

But the Big Red TD-24 does many other time-saving, work-saving jobs around the place.

"We haven't found the limit to the jobs the TD-24 can do around a mine," says Superintendent A. S. Kane. *"Stripping and road building are naturals for it. The smaller jobs we can do faster, and in rock we find that by putting the tractor in to dig out all it can, we save a lot of blasting.*

"Sometimes we don't do any blasting—the tractor cleans up the job by itself!"

What can you expect from this versatile package of power? How can you use it to cut time and expense on many, many jobs? See the man who can give you all the facts and figures—your INTERNATIONAL Industrial Distributor. Get in touch with him soon for a demonstration of "power that pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL

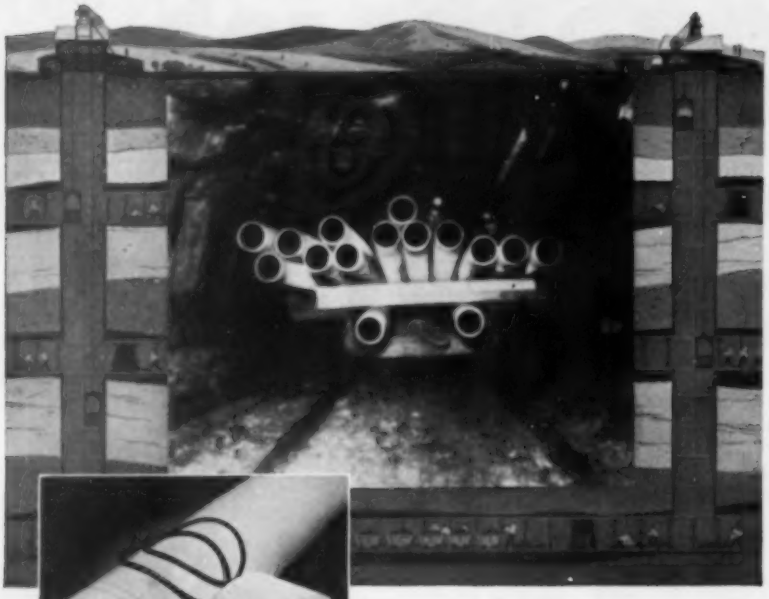
INTERNATIONAL HARVESTER

* *Phased* Equipment—Machines designed and built to handle each major phase of earthmoving most efficiently and economically.

For every move in Earthmoving

See INTERNATIONAL'S "Job-Phased*" equipment

Now available for mine service . . .



Transite Pipe with the new Ring-Tite Coupling

Cuts installation costs through fast assembly—insures locked-in tightness

MINE OPERATORS have found that Transite® Mine Service Pipe offers many advantages in addition to its long service life. Now with the new Ring-Tite® Coupling, pipe goes together faster, assuring even greater savings in installation.

Proven Corrosion-Resistance

Over a period of many years' service, asbestos-cement Transite Pipe has proved its ability to stand up under the corrosive action of acid mine drainage water. It is light in weight and easily handled. Lines are quickly assembled, even in restricted mine passages. The new Ring-Tite Coupling forms a tight, yet flexible joint that permits deflections of up to 5° at each coupling.

Available for working pressures up to 150 lbs. per square inch and in a full range of diameter from 4 inches up, Transite is also a money-saving pipe for many other mine uses.

For complete information about the new Ring-Tite Coupling and about Transite Mine Service Pipe write for Brochure TR-51A and TR-142A, Johns-Manville, Box 60, New York 16, N. Y.

Johns-Manville TRANSITE Mine Service Pipe

by Gar Wood Industries, Wayne Div., Wayne, Mich., is said to offer at no extra cost over previous models a new design that provides 14% more lifting capacity, longer hoist life and easy maintenance without special tools or hydraulic specialists. A new line of matching dump bodies, the Gar Wood "GA" series, is designed to meet particular job needs at the lowest possible cost and provides 12 models, including general contractors', coal and coke, combination dump-and-platform and other-type bodies. Details from Gar Wood.

Equipment Shorts You'll Want to Check

(19) PLASTIC PIPE is a new addition to its line of industrial rubber products, the Hamilton Rubber Mfg. Corp., Trenton 3, N. J., has announced. The pipe is flexible and light weight, and has been especially developed for conveying liquids intended for human or animal consumption. It offers complete immunity to rot, rust and electrolytic corrosion. Nominal pipe sizes are ½ to 1½ in, with rated burst pressures from 450 to 200 psi. Samples and literature from company.

(20) PORTABLE HAND TACHOMETER featuring a scale-changing device which reduces misreading of its various ranges has been announced by the General Electric Co., Schenectady 5, N. Y. Three different models, each having three ranges, are capable of measuring rotational speeds from 2 to 100,000 rpm and linear speeds from 2 to 10,000 fpm with accessories. Accuracy is plus or minus 1% of full scale, according to G-E engineers. The unit weighs 3¾ lb complete, including carrying case.

(21) BALL-BEARING PILLOW BLOCKS—New, low-cost ball-bearing pillow blocks with pressed-steel housings, designed for applications where speeds are relatively low and loads are light, have been announced by Link-Belt Co., Chicago 1. The new bearing blocks cost less yet give all the advantages of precision antifriction-bearing performance, it is said. They are easily installed and are self-aligning in all directions to assure smooth operation and long life. Folder 2517 describing the new Series JPS-200, for shafts from ⅝ to 1¾ in in diameter, is offered by Link-Belt.

(22) NEW FILTER CLOTH woven from du Pont Dacron shows excellent resistance to both acid and caustic attack at room temperature, is strong and flex resistant and stands up under severe abrasive conditions, the maker reports. Preliminary tests show that Dacron outranks all other fibers except nylon, whether natural or synthetic, in abrasion resistance, and that nylon and Dacron, of all available fiber types, can withstand mechanical attack far in excess of normal filtration requirements, the company says. Details from the National Filter Media Corp., New Haven 14, Conn.

You depend on your equipment to do your work quickly and economically—so don't impede its production ability with inefficient wire rope. Use Yellow Strand Wire Rope and your machinery will be able to work at full capacity with fewer stops for rope changes.

Yellow Strand is constructed of wire, accurately drawn to Broderick & Bascom specifications . . . is twisted into strong, compact strands by precision machines . . . then into ropes of unequalled flexibility, strength and wear-resistance. Yellow Strand spools onto drums smoother,

YELLOW STRAND WIRE ROPE CAN GET CAPACITY PRODUCTION FROM YOUR MACHINES!

resists kinking and runs over sheaves with less fatiguing. Make sure your equipment is able to produce at top capacity—specify Yellow Strand next time you order wire rope.

Get Top Capacity With SPEEDI-SERVICE!

New rope on your machine in minutes instead of hours, no records to keep, minimum stocks of wire rope—that's Speedi-Service, offered only by your Broderick & Bascom distributor. There's no extra charge for this extra service, so start your Speedi-Service Plan today. Call your B & B distributor for details!

SPECIFY ... Yellow Strand®

For Savings · Safety · Speedi-Service

BRODERICK & BASCOM ROPE CO.

4203 Union Blvd.
St. Louis 15, Mo.

"The best machinery built"

—GORDON W. GRAY, *superintendent, Birchfield Mining Co.*

This Caterpillar No. 212 Motor Grader keeps 13 miles of haul road fast and smooth. It also cleans up around the shovel working a five-foot seam of Clintwood hard coal at the Birchfield Mining Co.'s stripping operation in Wise County, Va. The company also owns a fleet of Caterpillar rubber-tired and track-type Tractors.

"In my estimation, Caterpillar makes the best machinery built," says Gordon W. Gray, superintendent. "Relationship with our dealer is exceptional." The company mechanic adds, "Cat* equipment is the easiest to maintain."

The economical No. 212 can pay for itself in terms of faster cycle times and reduced equipment wear-and-tear on *your* haul roads. It's low in initial cost, and low in operating cost because of its sturdy yet simple Caterpillar construction. The Caterpillar Diesel Engine delivers full power for only pennies per hour on money-saving No. 2 furnace oil. It's a Caterpillar Motor Grader through and through: excellent visibility, positive, non-creeping controls, and wide range of blade positions without stopping to change links.

Only Caterpillar Motor Graders are made entirely by a single manufacturer. This means true balance between power, weight and working speed—no compromising to "make do" with available components. It also means dependable parts and service from a *single* source—your nearby Caterpillar Dealer. See him now for an on-the-job demonstration of the No. 212 Motor Grader. He can arrange delivery in time to give *your* roads a "spring tonic" for more profitable operation.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

(33) **INFRARED LAMP**—Development of a "revolutionary new type" of infrared lamp, "of tremendous potential" for scores of heating, drying, baking, etc., has been announced by General Electric's Lamp Div., Nela Park, Cleveland 12. It is a radical departure from any previous infrared lamp since it comes in a compact tubular shape, slightly larger in diameter than a cigarette, and has a tube made of fused translucent quartz that offers unusual ability to withstand high temperatures and the shock of violent temperature changes, it is said. Producing more than four times the energy concentration delivered by the 250-w infrared bulb, the new lamp is being introduced in two sizes, 500 and 1,000 w, for use on voltages of 115-125 and 230-250, respectively. Details from G-E.

(34) **CHAIN SPROCKETS**—Taper-Lock roller-chain sprockets in both single- and double-hub types are now available in an expanded line of stock sizes for No. 120 (1⅜-in pitch), No. 140 (1¾-in pitch) and No. 160 (2-in pitch) chain from Morse Chain Co., Detroit 10, Mich. Only five bushing sizes are required to fit the newly expanded line, and advantages of the Taper-Lock design include fast delivery from stock without reboring, easy installation, and gripping of both standard and undersized shafts with firmness of a shrink fit, the maker says. Specification data from company.

(25) **2-WAY RADIOS**—New G-E radio transmitter-receiver combination units for operation at recently authorized frequencies between 450 and 470 mg are expected to be most useful in municipal and some industrial applications where the lower frequency channels have become seriously crowded, according to the company. Mobile models will function from either 6- or 12-v batteries, with no adjustments necessary to revert from one to the other. Nominal output of mobile units is 20 w and all station units have 40-w output, rated for continuous duty. Details from the General Electric Co., Electronics Park, Syracuse, N. Y.

(26) **PORTABLE PHONE**, called "Minipak," is a new battery-operated FM radio unit weighing only 8 lb. complete with batteries and 2-channel transmitter-receiver, designed and engineered for forestry use construction crews, survey parties, etc. The batteries have a normal operating life of over 8 hr and the unit is supplied with a zipper carrying case and a packstrap, with removable ship antenna folding up into the carrying case. Details from Radio Specialty Mfg. Co., Portland 14, Ore.

(27) **OUTDOOR MOTORS**—Full protection against moisture and corrosion is provided in a new line of E-M "Sil-Clad" weather-protected squirrel-cage induction motors of 250 hp and up which features complete silicone insulation on the motor winding, silicone enamel baked on all exposed metal parts and stainless steel on parts subject to air abrasion. The silicone has excellent heat resistance, repels water, is inert to corrosion from most air-borne chemical fumes and resists oxidation and sunlight, the maker points out. Bulletin 209 from the Electric Machinery Mfg. Co., Minneapolis 13.

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. **(June 1954)**

1	5	8	12	16	20	24	28	32	36	40	44	48
2	5A	9	13	17	21	25	29	33	37	41	45	49
3	6	10	14	18	22	26	30	34	38	42	46	50
4	7	11	15	19	23	27	31	35	39	43	47	51

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

.....

Name (Print) ..... **Position** .....

Company .....

Address .....

NOT GOOD if mailed after Aug. 1, 1954

(28) **GOGGLES**—The unusual hinged bridge of the Willson Contour-Spec offers a new concept in eye protection since one size fits all faces, broad or narrow, long or short, with complete comfort, the maker says. Stocks are minimized since the Contour-Spec also will adjust automatically for any bridge width from 18 to 26 mm and is suited for use with a respirator. Bulletin from Willson Products, Inc., Reading Pa., available via postage-free card above.

(29) **MOBILE RADIOS**—New Motorola line of 114-174 mc, 10- and 25-w FM mobile 2-way radios, known as the Universal Uni-Channel Series, operates interchangeably from either 6- or 12-v automotive electrical systems without any circuit modification and features a patented long-life dual-interrupter all-vibrator power supply for operation of both the transmitter and receiver, the maker says. Details from Motorola Communications & Electronics, Inc., Chicago.

FREE BULLETINS AVAILABLE

(30) **ROOF-BOLTING APPLICATION**—Booklet 4155 offered by Ingersoll-Rand Co., New York 4, has been prepared as a guide to the procedures and techniques of "rock-bolting," a term, the company explains, that goes beyond roof-bolting to include bolting in the sides or bottoms of openings in rock. The 12-p booklet deals with the theory of rock-bolting, illustrates how rock-bolting works and outlines its advantages and disadvantages. Sections cover procedure, types of bolts, size of holes, bearing plate, torquing the nuts, types of drills used and size of impact wrenches recommended, etc. A complete line of equipment for bolting is briefly described.

(31) **V-BELTS**—Booklet containing engineering and design data on multiple V-belts offered by the Goodyear Tire & Rubber Co., Akron 16, Ohio, includes the recently approved horsepower ratings by the Rubber Mfg. Association and the Multiple V-Belt Drive & Mechanical Power Transmission Association. The handbook provides a comprehensive explanation of the fundamentals of V-belt design, selection and installation, with complete selection data on Goodyear's line of steel-cable V-belts.

(32) **JACKS**—New 40-p Duff-Norton jack manual explains how to choose the right jack for the job, lists types of ratchet, screw and hydraulic jacks—from 3- to 100-ton capacities—and gives complete specifications for each jack, together with details on how to use, care for and maintain jacks. Because of the many safety hints in the manual, it will be used by the National Safety Council as an integral part of its literature on the proper use of jacks, the company reports. Catalog 204 is available from Duff-Norton Mfg. Co., P. O. Box 1889, Pittsburgh 30.

(33) **SAFER WELDING**—Specifically designed for welding and cutting operators handling oxyacetylene and arc-welding equipment, new 32-p pocket-sized Air Reduction booklet entitled "Safety" details cautions and rules for personal safety. It discusses the handling and maintenance of cylinders, torches, regulators and hoses, safe practices in setting up, adjusting, using and shutting down of the equipment. Offered by Air Reduction Sales Co., New York 17.

(34) **ENGINE MAINTENANCE**—How to insure plenty of clean air of the right temperature is discussed in detail in Service Bulletin 16, "Air for Your Engine," issued by Cummins Engine Co., Inc., Columbus, Ind. Designed for help to all users of internal combustion engines, gas as well as diesel, the booklet outlines practical servicing pointers and includes a checksheet for air-cleaner maintenance.

(35) **LUBRICATION**—36-p Data Book 54-1, "Proper Lubrication . . . The Life Blood of All Machinery," is offered by Lubriplate Div., Fiske Bros. Refining Co., Newark 5, N. J. In addition to discussing properties and application of Lubriplate products, the book lists recommended

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lubricants for coal-mining machinery, electrical equipment, etc.

(36) TRANSMISSION LUBRICATION—To help equipment owners obtain maximum performance and longer wear-life from Fuller transmissions, a new lubrication recommendation folder has been released by Fuller Mfg. Co., Kalamazoo, Mich. Based on Fuller's 50 yr of experience in manufacturing heavy-duty transmissions for both on- and off-highway trucks and industrial equipment, the folder defines the basic functions of transmission lubricants, describes types and seasonal grades recommended and lists all Fuller transmissions by model, with the lubricant capacity of each.

(37) PUMP SELECTION—Form 7123, available from Ingersoll-Rand Co., New York 4, is actually a slidefilm presentation in printed form. It gives a brief description of what a centrifugal pump is and how it works, points out the various factors that must be considered in selecting a pump to meet a specific installation, outlines a typical problem and its solution, and states the material recommended for various pumping installation, with actual installation views.

(38) VIBRATING CONVEYORS—Booklet 135-A describing the Hewitt-Robins line of vibrating conveyors illustrates various typical installations and covers technical details of design and application for both the Rockermount and Springmount-type conveyors. Available from Hewitt-Robins, Inc., Stamford, Conn.

(39) SCREENS—Simplicity Engineering Co., Durand, Mich., offers new Catalog 66 covering its complete line of woven-wire screens for repair and replacement. The catalog describes the methods employed to fabricate wire screening to exact specifications and lists the sizes and types of woven-wire screen now available for immediate delivery.

(40) MOVIE SHOWING how electric wires and cables are made is available for use of interested groups from the Rome Cable Corp., Rome, N. Y. The 45-min sound-color film, entitled "Cable—Pathway of Power," details the various steps in production of wires and cables, starting with copper bars and aluminum ingots and following through to the finished product. The manufacturing operations were photographed in the Rome Cable's plant and the narration is by Karni Evans, well-known newsreel commentator.

(41) BATTERY MAINTENANCE—New pocket-sized Exide booklet on storage-battery maintenance breaks down battery care to seven basic rules, and is designed to be particularly suitable for distribution to maintenance personnel and others who might have to deal with batteries. Form 5063, entitled "Seven Rules for Maintaining Your Exide Ironclad Battery," is available from the Electric Storage Battery Co., Box 8109, Philadelphia 1.

(42) CURRENT-LIMITING REACTOR—Type MSP self-shielded current-limiting reactors are described in new Booklet B-5918 available from the Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30. Pointing out that the reactors are now available for installation on industrial branch circuits, the booklet shows how they provide cost savings by (1) eliminating the need to purchase complete new protection equipment when you "power up" your main bus capacity and (2) permitting purchase of lower rated protective apparatus for new installations.

(43) HOISTS—Bulletin SP offered by the Coffing Hoist Co., Danville, Ill., describes its entire line of Safety-Pull ratchet-lever hoists, including both roller and coil-chain models, with capacities ranging from ¾ to 15 tons. In addition to features, specifications and special hooks, the bulletin illustrates the ratchet-pawl construction that eliminates friction brakes and the quick-disassembly feature of the coil-chain hoists.

(44) CORROSION-RESISTANT COATINGS—Applications, serviceability, methods of applying, cost and life of each product in a line of corrosion-resisting linings and surfacing materials are tabulated for easy reference in Bulletin 100 published by the Carboline Co. Div., Mullins Non-Ferrous Castings Corp., St. Louis 19, Mo. Designed specially for maintenance or specification men, the bulletin defines the Carboline products in general terms and estimates the life of the product in each of various broad corrosive-service conditions.

(45) ROOFING AND SIDING—Bulletin describing the use of V-Corr enamel-on-steel roofing and siding material is offered by the Toledo Porcelain Enamel Products Co., Toledo, Ohio. Bulletin provides detailed specifications and installation methods.

(46) HARD-SURFACING—Complete information as to type of alloy to use, preparation, welding and finishing procedures for hard-surfacing equipment parts commonly used in coal mining, earth-moving, dredging and other industries is provided in a new "Hard-Surfacing Manual" issued by the Victor Equipment Co., Alloy Rod & Metal Div., Los Angeles 59, Calif. Alloy recommendations and welding procedures are based on "job-tested" usage of latest accepted alloys and methods, and the complete VICTOR line of hard-surfacing alloys described.

(47) POWER-TRANSMISSION — 24-p Catalog 118 offered by the Lovejoy Flexible Coupling Co., Chicago 44, provides full data on its line of variable-speed pulleys, wide V-belts, sheaves, motor bases, countershafts and Select-O-Speed transmissions. Specification data covers ratings and dimensions and representative applications for a wide range of units.

(48) INDUSTRIAL INSTRUMENTS—Revised Composite Catalog 5001 provides brief descriptions of Brown industrial instruments and equipment. The 28-p booklet outlines applications and operating features for the wide line of equipment for indicating, recording and controlling variables of many types. Offered by Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia 44.

(49) CONVEYOR—Bulletin offered by Gifford-Wood Co., Hudson, N. Y., describes its "Flowmaster" conveyor, an enclosed endless chain fitted with specially designed flights to convey various free-flowing materials, including coal, stone, or ores, in vertical, horizontal or inclined planes. Included are dimension engineering drawings and details of the Flowmaster self-loading, self-discharging and self-cleaning features.

(50) HOSE COUPLING—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines which is said to provide permanent freedom from leakage is described in a bulletin from Titeflex, Inc., Springfield 4, Mass. Entitled "Titeflex Quick-Seal Coupling," the 16-p booklet contains full specifications and application features.

(51) TESTING SIEVES—Newark Wire Cloth Co., Newark 4, N. J., offers a new bulletin covering the Newark line of standard testing sieves, market-grade testing sieves and the Newark testing-sieve shaker, with full details of application, specifications, etc.

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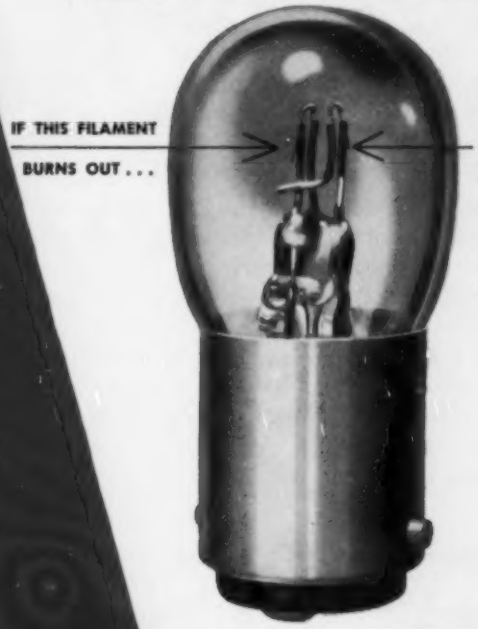

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FINANCIAL AID TO HIGHER EDUCATION

What Business Can Do to Help Our Colleges and Universities

Is the financial squeeze now gripping our colleges and universities grave enough to warrant direct action by the business community? If so, what can business do about it? This editorial is addressed to these two questions.

In the previous editorial in this series of two, it was demonstrated that **our colleges and universities, and particularly the independent institutions, face financial difficulties, which, unless relieved, promise to get progressively worse and might ultimately result in a national disaster.** This state of affairs obviously gives the business community a crucial stake in helping to relieve the plight of these institutions. For our business organizations can be no stronger than the total community of which they are a part.

It does not follow automatically, however, that every business firm should give direct financial aid to education. Already the business structure is heavily burdened with activities unrelated to its main purpose. These include acting as tax collector for more than $65 billion of federal, state and local taxes in the year 1953. There is a limit to the amount of such public enterprise that can be loaded on the business system.

Business Holds Key to Answer

If, however, the survival of a key part of our educational system depends on its having financial help from the business community, that help should be provided. And this is the situation of our independent privately endowed colleges and universities.

Of course, our tax-supported institutions of higher learning must also be kept strong, financially and otherwise. But they have recourse to public support not available to the independent institutions. Largely on this account, their present financial difficulties are much less acute than those of the independent colleges and universities.

These independent institutions have seen price inflation eat away much of the value of their endowments. Moreover, there is no prospect that these endowments can be sufficiently replenished by gifts from the wealthy people who provided them in earlier years. Progressive income and estate taxes have seen to that. Thus, they are faced not only with a peculiarly acute financial problem, but also one which cannot be solved except by tapping other sources of aid.

Tax Support No Solution

It is conceivable that the independent colleges and universities might solve their financial problem by seeking support from tax revenues. If they did this, however, they would lose their distinctive character as independent institutions, and our system of higher education would lose one of its major elements of strength. That is the existence in our educational system of both independently financed and tax-supported colleges and universities. Each has its special contribution to make to a well-balanced system of higher education.

Business is directly dependent upon higher education to staff its increasingly complex and exacting operations. A key part in this process is played by the small, independent liberal arts colleges which are the hardest hit financially of all our institutions of higher learning. "These," states the Council for Financial Aid to Education, recently formed by a group of business leaders, "have contributed a high proportion of the intellectual, scientific and religious, as well as business leadership of the nation. Their programs are devoted to the teaching of values, particularly the values of freedom. They are a vital bulwark to our system of free enterprise."

Means of Providing Help

There are many means by which business firms can extend help to our colleges and universities. The most obvious, of course, is to make outright grants of money either to individual institutions or to groups of institutions for such uses as the institutions think best. Another means of help, increasingly employed by business firms, is to establish scholarships to pay the full cost of college or university courses of study. Sometimes the scholarships are open for general competition, sometimes they are limited to employees and children of employees of the firm granting them. Not infrequently those winning the scholarships spend some part of their school vacations working in the companies granting the scholarships.

A number of companies have recently provided for what have come to be called "scholarships in reverse." These companies pay a flat sum to a college or university for every one of its graduates they employ. Financing of university research programs also offers a broad avenue for financial aid to our universities by business.

Need Two-Way Communication

Some business firms have well-developed programs for financial aid to education. But they are exceptional. For most companies the problems involved are new and strange. These companies were created with the basic purpose to make money, not to give it away. Successful philanthopic operations involve a whole set of problems with which they have very little experience. Not the least of these is how to make business a dependable source of financial aid to education, since business has no assurance that the profits of one year will not be losses the next.

Considerations such as these emphasize the wisdom of a recent Industry-College Conference on aid to higher education by business, in making the first of its ten conclusions that "better communication, by direct contact, is needed for each [industry and the colleges] to understand the problems of the other." At this juncture the creation of mutual understanding is much more important than the raising of some money and letting it go at that. The problem of aid to education by business has its immediate urgency, but there is also a long-range program to be developed on which business and the colleges and universities must pull together in the years ahead to find a satisfactory solution.

As stated at the outset, failure to find a satisfactory solution could result in a national disaster. This means that, **to give proper heed to their own future prosperity and the future welfare of the nation, business firms generally must go to work on the problem of financial aid to higher education. They must go to work first, to understand the problem; second, to establish two-way communication with our colleges and universities about it; and third, to develop a program which pays proper heed to the needs and capabilities of both business and higher education.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

*Top photo shows Face Conveyor in British coal mine. Inset shows roll of SCANDURA.

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About 12% of coal mining fires in the past several years have been attributed to conveyor-belt friction.

At the 1953 annual meeting of the Illinois Mining Institute, data was presented to show that the majority of belt fires result from stalled belts while the driving pulley continues pulling.

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NEWS ROUND-UP

Coal Presses Fight for Square Deal

TOUGHEST PROBLEMS of the bituminous industry got a thorough going-over May 20-21 as top-drawer executives of 35 to 40 major producing companies, representing some 150,000,000 tons of commercial output, met informally at Chicago "to take the industry's pulse" and give "a second hard look to its economic plight." The first such look took place at New York City April 23, when the same group met for off-the-record talks.

No list of the executives attending the Chicago meeting was made public but it was clear to reporters outside the meeting rooms that representation from all producing areas was strong. This observation was borne out by L. C. Campbell, vice president, Eastern Gas & Fuel Associates, spokesman for the conference, who declared that for the first time in the industry's history, leading operators from all sections of the Nation were erasing their sectional differences in a unified search for answers to coal's most stubborn problems.

Asserting that the two-day conference guaranteed a positive approach to the industry's situation, Mr. Campbell reported that several committees now are at work. Subjects assigned to committees are believed to include freight rates, federal taxes, imported residual fuel oil, inferior uses for natural gas, coal merchandising and fringe benefits in the labor contract.

Mr. Campbell declared that the conference had determined to press the point that the federal government must not remain blind to the threat to the Nation's security brought on by the closing down and scrapping of hundreds of American coal mines, with attendant loss of employment to skilled miners and workers in other industries. Stressing inescapable needs for coal to fuel power plants, coke ovens and general industry if war should break out, he charged the government with ignorance of the role coal must play in peace and war, and with neglect of measures necessary to keep the industry strong. "It is little short of criminal foolhardiness to foster competitive industry in all corners of the world and forget the vital role of bituminous coal in this Nation in time of peace, defense preparation and war," he said.

Conference deliberations naturally are believed to have included labor and wage problems, including the question of union relations. Privately, a Southern operator attending the meeting assured at least one reporter that there would be no attempt on the part of those attending to "bust" the union or abrogate the contract.

Mr. Campbell declared that the producers' conference is not intended to supplant any existing industry organiations, such as National Coal Association, American Mining Congress, American Coal Sales Association or any groups that deal with wage negotiations. He explained that the conference is altogether informal. The group has no permanent chairman, no secretary and no treasurer and it levies no assessments, he said.

A third meeting of the producers' conference will be held at Cincinnati sometime in June, it was reported.

Meanwhile, other groups and individuals representing bituminous, anthracite and other industries and interests moved on several fronts in coal's behalf.

In Washington, Rep. James Van Zandt, Pennsylvania, introduced a "Protect America" bill (H. R. 9178) which, he said, would foster world trade without endangering the Nation's security and economy. While including the proposed 5% quota limitation on imports of residual fuel oil, the Van Zandt measure would restore final responsibility for tariff matters to Congress. In an address in the House asking for passage of his bill, he specifically mentioned the following industries now suffering from "our absurd trade practices": coal, glass, pottery, domestic oil, textiles, machine tools, wood and lumber, fish, bicycles, toys, confections, lace and watches.

With bituminous production at mid-May down 17% and anthracite output down 6½% below 1953 levels, both industries stepped up their search for ways to recoup their losses and assume their rightful share of the Nation's energy load. Supported by governors of coal-producing states, the mineworkers' union and related industries and workers, coal operators were reported to be seeking relief along one or more of the following lines:

1. A legislative curb on imported residual fuel oil.
2. Greater use of coal by the Atomic Energy Commission, the Defense establishment and other government agencies.
3. Removal of barriers against exports of American coal to Western Europe.
4. A subsidy program enabling rail-

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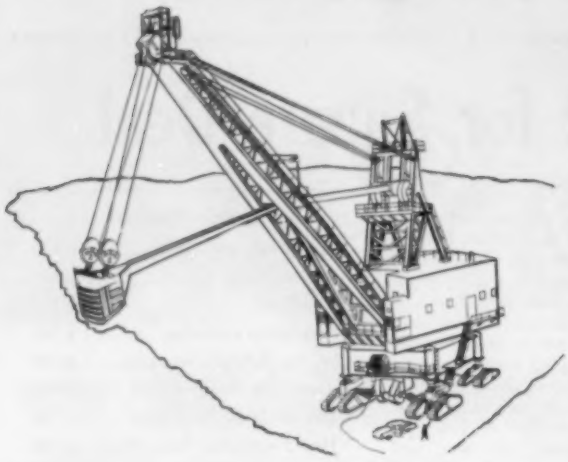
STATING COAL'S NEED before a conference of 16 governors of coal-producing states, Tom Pickett (left), NCA executive vice president, stresses coal's role in national security as Gov. John S. Fine, Secretary of the Interior Douglas McKay, John L. Lewis and Frank W. Earnest Jr., Anthracite Institute president, listen.

New Hanna Strip Shovel To Top All Others by 50%



A NEW, giant coal-stripping shovel, believed to be the biggest land vehicle in the world, is now being built for the Hanna Coal Co. Div. of Pittsburgh Consolidation Coal Co. by the Marion Power Shovel Co., Marion, Ohio. Expected to cost $2½ million, the shovel as a whole will be 50% larger than any existing equipment of its kind and is designed to uncover coal seams lying approximately 90 ft below the surface.

While the bucket design is not yet frozen, its capacity may well be 60 cu yd, making it possible to move close to 100 tons of earth every 50 sec. The unit will weigh a total of 5 million lb, including 1 million lb of ballast. James Hyslop, president of the Hanna Coal Div., plans to place the giant unit in operation at the company's stripping in southeastern Ohio immediately after its completion, scheduled for late 1955.

From the ground to the top of the boom, the shovel will rise 145 ft in the air or as high as a 12-story building. The relative size of the machine is indicated by comparison with the man and car at the lower right in the artist's sketch drawn to scale.

To provide access to the control section, an office-build ng-type elevator is being built to carry 1,000 lb, or three passengers, and will be installed in the hollow 6-ft-diameter center pin. The shovel will be powered by 16 motors, totaling 4,500 hp. Its eight crawler treads, mounted in pairs, will each measure 8 ft high, 22 ft long and 54 in in tread width.

roads to carry coal to industrial markets at lower cost.

5. Freight differentials favoring long-haul deliveries of coal.

On May 6, Sen. J. S. Cooper, Kentucky, led a group of bituminous representatives from Kentucky, West Virginia, Pennsylvania, New York and Washington into a conference with Felix A. Wormser, Assistant Secretary of the Interior, and W. F. Hahman, Defense Solid Fuels Administration, with a plan for increasing coal consumption by 50,000,000 tons per year. Sen. Cooper reported that the group suggested that coal be used in government buildings and installations at home and abroad, that coal be protected from excessive natural-gas competition, that freight rates on coal be limited, that research in coal utilization be cooperatively financed and the American coal be given fairer treatment abroad.

Earlier, in April, coal's battle to preserve the industry's strength and safeguard the Nation's fuel supplies gathered momentum as chief executives of 16 coal-producing states, led by Pennsylvania Gov. John S. Fine, organized the Governors' Permanent Fuel Conference to formulate a program guaranteeing adequate fuel supplies for peace and war.

The governors' group met at Washington April 26, the day before a conference of all governors called by President Eisenhower for a general briefing on foreign and domestic problems. Citing mine closings, miner unemployment and injury to the Nation's security, the 16-governor conference asked for curtailment of imports of residual fuel oil and asked congressional delegations of the affected states to press for such legislation.

Addressing the group of 16 governors were John L. Lewis, UMWA president; Tom Pickett, executive vice president, National Coal Association; and F. W. Earnest Jr., president, Anthracite Institute. The speakers reported growing unemployment in bituminous and anthracite, depression and distress in mining communities and losses in related industries arising from import of heavy fuel oil equal to 33,000,000 tons per year. They warned that submarines could cut off foreign oil quickly if war broke out, leaving the Nation dependent on the domestic oil industry and the coal industry, both of which now are being weakened by cheap foreign oil.

On April 28, the day following the President's conference for all governors, the 16-governor group elected the following officers: chairman, Gov. Fine; vice chairman, W. C. Marland, West Virginia; secretary, W. G. Stratton, Illinois; executive committee: F. J. Lausche, Ohio; L. W. Wetherby, Kentucky; G. N. Craig, Indiana; Johnston Murray, Oklahoma; and Govs. Stratton and Marland. Attending the conference or represented there were the following governors: Gordon Persons, Alabama; Dan Thornton, Colorado; E. F. Arn, Kansas; P. M. Donnelly, Missouri; Norman Brunsdale, North Dakota; F. G. Clement, Tennessee; J. B. Lee, Utah; T. B. Stanley, Virginia; and C. J. Rogers, Wyoming.

Earlier, on April 25, the day before the 16-governor meeting, the UMWA issued a statement asking for a sound national fuels policy that would strengthen the Nation while helping the coal industry. The statement said that the international situation "makes it mandatory that the American coal industry be kept strong and efficient in order to meet the fuel and energy needs of our Nation and our allies."

Meanwhile, gathering support from other industries affected by unrestricted imports, representatives of National Coal Association and Foreign Oil Policy Committee laid plans to attend a conference called for May 18 at Washington to shape a foreign-trade policy. Sponsor of the meeting was the Nation-Wide Committee of Industry, Agriculture and Labor on Export-Import Policy.

On the natural-gas front, a subcommittee of the Senate Committee on Interstate and Foreign Commerce in May continued its hearings on the Hunt bill (S. 1287), which would direct the Federal Power Commission to weigh the effects of imported fuel on employment before granting licenses to bring Canadian natural gas into the United States. The Senate bill is sponsored by Senator Lester C. Hunt, Wyoming. A similar bill has been introduced in the House by Rep. D. R. Stringfellow, Utah. Rep. Stringfellow testified May 13 before the Senate subcommittee.

New Keystone Off Press, Lists 1,892 Coal Mines

The 1954 edition of *Keystone Coal Buyer's Manual* now is available, according to J. R. Forsythe, manager. An affiliate of *Coal Age*, the 721-p book lists 1,444 coal-mining companies and 1,892 mines operating in 1953. All are completely indexed.

Known as the coal man's "Bible," *Keystone* lists and gives details about sales and operating companies, together with names of executives and locations of offices; mines, including locations, types of opening, seams and thicknesses, number of employees and tonnages produced; preparation equipment, including data on washing, air-cleaning and drying units; seams of coal, characteristics, analyses, uses and reserves; trade names; river transportation facilities; coke ovens; and export piers.

The 1954 volume is available upon order to *Keystone Coal Buyer's Manual*, 330 West 42nd St., New York 36, N. Y. Price is $25 per copy.

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News Briefs and Trends

UMWA Pickets Pennsylvania Mine Going Non-Union

UMWA pickets closed down properties of the Cambria Fuel Co. in Somerset County, Pennsylvania, May 3 as the company sought to operate on a non-union basis after previously notifying the union that it was terminating its contract. By noon, 21 other mines in the area also had been closed, but no violence was reported. Three of the closed properties were strip mines and most of them were reported to lease their land from Cambria Fuel. Union officials indicated that picketing would go indefinitely and on May 17 reports indicated that all 22 properties still were closed. Cambria Fuel was one of the first major companies publicly announcing that it would terminate its contract because of market and competitive factors.

Coal Group Hits TVA For Coal-Buying Policies

Coal-buying policies of the Tennessee Valley Authority are wrecking the Tennessee coal industry, Charles R. Griffith, president of the Southern Appalachian Coal Operators' Association, charged May 9 in a letter to Senator Gore (D., Tenn.). In the letter he said: "no coal operator who pays union wages can compete with the substandard-wage producer" and that the majority of the tonnage for the Kingston steam plant was awarded to firms paying less than the union scale. The TVA uses substandard producers to further depress the price of coal in the valley and does not penalize substandard operators if they cannot fulfill contracts, Mr. Griffith also maintained. John Oliver, TVA general manager, denied the charges and said that both large and small producers, union and non-union, "find ample opportunity to compete for a share of TVA business" and that bids for the Kingston plant are still being evaluated and that successful bidders have not already been determined. On the other points, Mr. Oliver said the coal industry is suffering from disappearance of most of its market for high-priced coal and "Failure to hold these markets is the real cause of these mines' problems. TVA is creating a new market." TVA requires evidence that a bidder can carry out his contract obligations and requires a performance bond if there is any doubt, he said.

Seaway Becomes a Law

The St. Lawrence Seaway bill authorizing the United States to join with Canada in building the waterway that will enable ocean shipping to go from the Atlantic to ports on the Great Lakes was signed into law by President Eisenhower May 13. Congressional approval of the project had been actively sought for some 20 yr and had long been opposed by coal, railroad, labor, port and other organizations. Bonds for $105 million will be issued under the new law to cover the American share of the estimated cost and Canada is expected to spend another $200 million.

UMWA in Three-Union Pact

John L. Lewis, UMWA head, speaking for David J. McDonald, president of the United Steelworkers (CIO), and Dave Beck, president of the International Brotherhood of Teamsters (AFL), announced an informal alliance of the three organizations agreed on at a luncheon conference in Washington April 30. The unions will combine to seek government action on unemployment and underemployment, the Taft-Hartley law and various legislation on the national, state and local level, Mr. Lewis said. There is a close identity of interest between the three unions and they have "a greater financial reserve than any three organizations in the American economy," Mr. Lewis pointed out. Affiliation of tugboat workers with the UMWA District 50 appeared to be a strong probability as officials of a New York local recommended in a letter May 4 that members vote to secede from the ILA. According to reports, District 50 would organize a new marine division and finance a nationwide organizing campaign for it.

EG&FA Summer Camps Start 18th Season

The 18th consecutive season of summer recreation camps for the children of Eastern Gas & Fuel Associates coal mine and store workers will open in late June, according to Virgil M. Beckett, Pittsburgh, Eastern's director of welfare. Upward of 1,000 boys and girls from 13 communities in West Virginia and three in Pennsylvania will be enrolled in five 2-wk periods during which they will engage in a full range of camping activities. Each camp is limited in attendance to assure uncrowded quarters for the children in their cottages and provides the supervision of one senior counsellor for each seven children, in compliance with recommendations of the American Camping Association, plus a staff of intermediate and junior counsellors. Camp Lightfoot, for white children, is located near Hinton, W. Va., and Camp Washington-Carver, for Negro children, near Beckley, W. Va.

Anthracite AIME Hears Report on Latin America

E. G. FOX (left), president, Philadelphia & Reading Coal & Iron Co., Philadelphia, and chairman, Pennsylvania Anthracite Section, AIME; Hon. John S. Fine, governor, Commonwealth of Pennsylvania, Harrisburg; and Dr. Milton S. Eisenhower, president, Pennsylvania State University, State College, at section meeting held at Hazleton, Pa., May 6. Some 225 members and guests in attendance heard Dr. Eisenhower, the principal speaker, review his recent trip throughout Latin America as special representative of President Eisenhower.

New School Construction Offers Opportunities to Coal

New school construction programs in southeastern states, which will cost several hundred million dollars, were described May 10 by J. Nelson Stuart, Director of National Coal Association's Market Promotion Dept., as a measure of coal men's oportunity to sell new tonnage. Mr. Stuart spoke to the annual convention of the Southeastern Retail Coal Association held in Atlanta, Ga., and he told the retailers, "You have what it takes" to sell this booming market. "The total fuel market is going to be enlarged by the construction not only of schools, but of health centers, hospitals, dry cleaning plants, dairies, garages, retail stores, factories and all other types of business and public buildings," he said. Bituminous coal's role as "the taxpayers' fuel" and its ability to save money for public school boards was presented May 13 at the spring meeting of the Wisconsin Association of School Business Officials, held in Green Bay, Wis., by Glynn C. Coryell, NCA engineering consultant. Citing surveys made in Ohio and Michigan which showed

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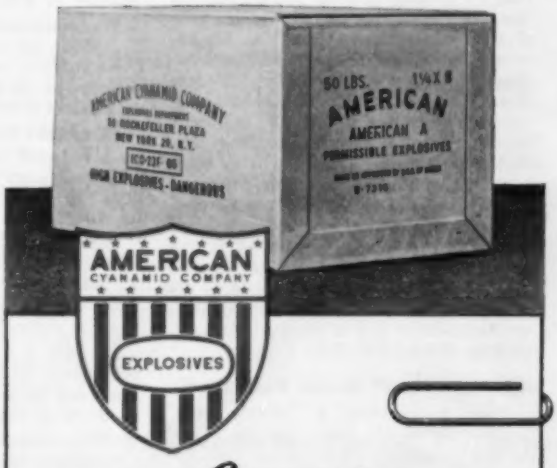

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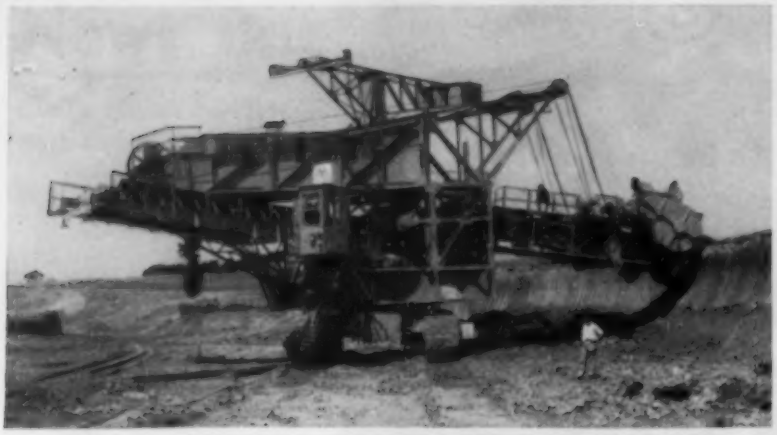

Bucket Excavator Mines Lignite in Yugoslavia

THIS 214-TON wheel bucket excavator is shown in one of three open-pit mines now in operation in the Kolubara lignite basin, some 45 mi southwest of Belgrad, Yugoslavia. The crawler-mounted, electrically driven unit has a capacity of 540 cubic meters per hour. The operation is one of those viewed by an expert sent to Yugoslavia by the United Nations Technical Assistance Administration to advise on increasing mining production, including the most economical use of present equipment and the use of new methods and machinery.

how the use of coal and modern equipment is effecting economy in public schools of those states, Mr. Coryell told the school officials that fuel prices in Wisconsin "also permit an important saving on every ton of coal over the cost of fuel oil."

Anthracite Packaged As Grill Briquets

A new-type, vastly improved packaged fuel for grilling, broiling and barbecuing was announced last month by the Anthracite Equipment Corp., a wholly-owned subsidiary of Anthracite Institute. The new product, known as "Bonnie Burns" briquets, is a result of scientific research by the anthracite industry's laboratory in Wilkes Barre. The new fuel for all types of grills will be marketed in a 2-lb package that is as remarkable as the fuel itself. It is a smart, modern, cellophane wrapped cardboard box which is placed unopened in the grill. The user never touches "Bonnie Burns" briquets, since they are not removed from the box, and no kindling or other starter fuel is required. A single package burns for about 2 hr.

"Minute Men" Guide Published

How to organize a "Minute Men" team and how the team can use "Total Selling" to move more coal into the commercial and small industrial market is the theme of a new booklet, "The Minute Men of Bituminous Coal." The booklet tells who should be on the team, who should run it, what facts are needed to make an effective presentation of coal's merits, how to divide the work of the team, etc. Free copies of the booklet are available to coal-sales personnel upon request to Market Promotion Dept., National Coal Association, Southern Bldg., Washington 5, D. C.

Companies Report Earnings

West Virginia Coal & Coke Co.—3 mo to Mar. 31, 1954, net loss of $175,910 as compared with net income of $97,090, or 20c a share for the same period of 1953.

Ayrshire Collieries Corp.—9 mo to Mar. 31, 1954, net income of $1,102,665, or $1.94 a share, on sales of $25,327,445; 9 mo ending Mar. 31, 1953, net income of $1,801,150, or $3.17 a share, on sales of $30,215,354.

Westmoreland Coal Co.—Year to Dec. 31, 1953, net income of $133,488, or 89c a share on sales of $8,244,206; 1952, net income of $92,207, or 61c a share on sales of $7,531,566.

Clinchfield Coal Corp.—Year to Dec. 31, 1953, net income of $1,383,225 or $1.78 a share as compared to net income of $1,573,122 or $2.02 a share for 1952.

Pittsburgh Consolidated Coal Co.—3 mo to Mar. 31, 1954, net income of $2,244,000, or $1.04 a share as compared to net income of $2,973,000, or $1.37 a share for first quarter of 1953.

Joy Mfg. Co.—6 mo to Mar. 31, 1954, net income $2,176,114, or $2.43 a share compared to net income of $2,332,348, or $2.62 a share for the same period in 1953.

Goodman Mfg. Co.—Year to Dec. 31, 1953, net income of $553,203, or $4.61 a share on sales of $13,828,857; 1952 net income of $465,160, or $3.87 a share on sales of $14,945,830.

Independent Coal & Coke Co.—3 mo to March 31, 1954, net profit of $32,160, compared to loss of $50,975 for 1953 period; coal sales in 1953 quarter, 233,415 tons, against 226,286 tons.

Island Creek Coal Co. and subsidiaries—3 mo to March 31, 1954, net profit of $292,621, or 21c per common share, on total income of $8,055,534; 1953 quarter, net of $373,218, or 28c a share, on total income of $9,593,189.

Glen Alden Coal Co.—3 mo to March 31, 1954, net income of $424,000, compared with loss of $[illegible]00 in 1953 quarter, after depreciation and depletion charges of $586,000 in 1954 and $595,000 in the 1953 period.

Lehigh Coal & Navigation Co.—3 mo to March 31, 1954, estimated net loss of $130,000, compared with loss of $627,954 in 1953 period.

Philadelphia & Reading Coal & Iron Co. and subsidiaries—3 mo to March 31, 1954, net loss of $929,834 on sales of $12,331,102; compared with loss of $130,980 on sales of $14,278,607 in 1953 quarter.

Pittston Co. and subsidiaries—Year to Dec. 31, 1953, net income of $1,486,539, or $2.15 per share, compared with net of $3,286,683, or $5.18 a share; 1952 net includes profit on sale of capital assets totaling $1,604,062, equal to $2.53 a share.

Pond Creek Pocahontas Co. and subsidiaries—3 mo to March 31, 1954, net profit of $218,342, or 64c a share, on total income of $4,732,014; compared with profit of $343,176, or $1.01 a share, on income of $5,181,688 in 1953 period.

West Kentucky Coal Co.—3 mo to March 31, 1954, net income of $272,083, or 32c a share, compared with net of $439,687, or 51c a share, in 1953 period.

And For Your Information . . .

An arrangement to purchase 298,886 shares of stock of the Pittston Co., about 47% of the company's outstanding stock, by a group headed by Joseph P. Routh, Pittston president and chairman, was reported last month. The stock is being sold at the market value of about $7,000,000 by the Alleghany Corp., which had held it since 1930. Alleghany's chairman, Robert R. Young, is currently battling for control of the N. Y. Central R.R.

10,000 acres of Colorado state-owned coal lands near Craig have been leased by the Utah Construction Co., which reportedly is interested in the chemical and power potentials of the vast coal deposits in the area. The Utah firm was scheduled to begin core drilling last month to determine the nature of the deposits and is understood to be considering a $50 million installation that would include a steam-generating plant to produce electricity in extracting chemicals from coal.

To meet truck competion, railroads are seeking approval of a reduction of 44c a ton in their freight rates on industrial-type, fine-sized coal destined for use in northeast Ohio, the president of the Cleveland Electric Illuminating Co. told stockholders at the company's annual meeting late in April. The reduction, expected to take effect early in June, will apply to most of the coal burned by the utility or used directly by many industries in the area and is expected to

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stimulate industrial growth in the region, he said.

Building of coal-fired steam power plants along the upper Colorado River instead of the dams proposed for the Dinosaur National Monument, was suggested last month by Alex Hildebrand, an official of the California Research & Development Co. The coal plants would save taxpayers $200 million in construction costs and nearly $150 million in operating costs and would insure full electric power even in dry periods, he maintained.

Marketing of the output of the Moffat Coal Co. by the sales organization of the Glen Alden Coal Co. was scheduled to end May 31, according to an announcement by the companies. The Moffat company is organizing its own sales facilities. The agreement originated during the time when Glen Alden leased coal properties in Lackawanna County to Moffat.

Coal stripping in a West Virginia state forest is now in the courts, with the state having secured a temporary injunction restraining D. S. Blount, Roanoke, Va., from mining 300,000 tons of coal in the Kumbrabow State Forest. According to state officials, the outcome is of considerable importance since West Virginia owns mineral rights to only about half of the 121,000 acres in its parks and forests.

Some 60,000 acres of coal lands in McCreay and Pulaski counties, Kentucky, has been leased by D. D. Stewart, Pineville, Ky., according to news reports. Mr. Stewart is said to be planning development of the property, leasing much of it to truck-mine operators.

Fuel gas is not cheaper than coal, the Cincinnati Coal & Coke Association has emphasized in disputing a statement by the president of the Cincinnati Gas & Electric Co. A ton of smokeless coal costs an average of $16.38, a saving of $3.63 a ton over the gas equivalent of $20.01, while stoker coal averages $13.91 a ton, as compared with its gas equivalent of $19.14 a ton, the association reported.

Semet-Solvay Div., Allied Chemical & Dye Corp., is offering a $600 scholarship in mining engineering at West Virginia University for 1954-55, renewable for 3 more years if the recipient receives satisfactory grades. Applications are due by July 1 and full details are available from the School of Mines.

The Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., is reported to have acquired leases on several thousand acres of coal lands near DeKoven, Ky., on the Ohio River. The company is understood to be exploring the property but has not yet announced plans to open a mine in the area.

One man was killed and seven injured May 12 in what is believed to have been a gas explosion in one section of the Alpoca (W. Va.) mine of the Gaston Coal Co. The explosion, the first in the mine's 24-yr history, was thought to have been caused by a faulty reel switch on an electric locomotive and was confined to one section by heavy rock-dusting in the mine, it was reported.

A coal research Fellowship at the Mellon Institute, Pittsburgh, has been initiated by Bituminous Coal Research, Inc., to study problems connected with the mining, preparation, transportation and utilization of bituminous coal and some of its primary products, emphasizing laboratory research on chemical and process uses of coal and primary products. Dr. Richard A. Glenn, for the past 8 yr in charge of the coal-hydrogenation program at the Coal Research Laboratory of Carnegie Tech, will head the new Fellowship.

A new facility for the recovery of coal chemicals from crude tar has been completed by U. S. Steel's Tennessee, Coal & Iron Div. at its coal chemical department, Fairfield, Ala. The plant was built to supply the rapidly growing chemical industry of the South and is one of several being installed at various manufacturing divisions of U. S. Steel, in line with its recently established policy of maximum sales of coal chemicals.

Holmes Association Makes Safety Awards

A coal miner was one of five workers in the Nation's mineral industries honored by the Joseph A. Holmes Safety Association for heroic and timely action in saving lives. The awards, including four Medals of Honor for individual heroism and one Certificate of Honor for using modern lifesaving methods in an emergency, were announced recently by J. J. Forbes, director of the U. S. Bureau of Mines and president of the association, which is named after the first director of the Bureau.

The association, at a meeting held in Washington April 27, also voted a Certificate of Honor for Richard Mason, a reporter on the Beckley, W. Va., *Post-Herald,* for outstanding work in promoting interest in mine safety in southern West Virginia.

In addition to the heroism awards and the special awards, 405 Certificates of Honor were voted for exceptional safety records and outstanding success in supervisory work. These included certificates for 127 individuals, 77 coal mines and companies, 79 metal mines and companies, 99 petroleum plants and companies, 18 quarries and nonmetallic mines and companies, and 5 miscellaneous organizations.

Winner of a Medal of Honor award, Elmer Pifer, a miner at the Stanton mine of the Pleasant Valley Coal Co., Frostburg, Md., saved the life of Mine Foreman James Laber by removing a large rock that had fallen on Mr. Laber, carrying the seriously injured foreman out of the mine and then, by truck, to a hospital. The two men were preparing to leave the mine at the end of their shift when Mr. Pifer heard the rock break. He shouted a warning to Mr. Laber, but not in time, and the foreman was caught by a fall of rock about 8½ ft long and 6½ ft wide, varying from 3 to 6 in in thickness. Working under the weakened roof, Mr. Pifer managed to remove the rock. Then, on his hands and knees and with the injured man on his back, he crawled 450 ft to the main entry through an entry only 39 in high. He then placed Mr. Laber in a mine car pulled by a pony and took him about 3,000 ft to the surface.

Anthracite Film Shows Automatic Home Heating

A brand-new 16-mm color motion picture titled "Black Diamonds," telling the story of anthracite from mine to market, now is available for free showing to civic clubs, schools, colleges, television audiences and other groups.

The 27-min film was viewed for the first time at a private press showing May 13 in New York City. Narrated by Lowell Thomas, it unfolds the origin and history of anthracite and shows mining, processing and distribution. It also displays the newest advances in automatic home-heating systems using anthracite. Geologists and fuel technicians of Pennsylvania State University were technical consultants in producing the motion picture and, together with students, appear as actors in the film.

The film may be obtained free upon request to any local anthracite dealer who is participating in the industry's new public-relations program or to Anthracite Information Bureau, 380 Madison Ave., New York 17, N. Y.

Anthracite Firms Curtail Deep-Mine Operations

Suspension of deep-mining operations at a number of anthracite collieries, some for indefinite periods, has been reported by major producing companies, including Lehigh Navigation Coal Co., The Hudson Coal Co., Lehigh Valley Coal Co. and Philadelphia & Reading Coal & Iron Co. Lehigh Navigation announced an indefinite shutdown on all coal-mining operations because of excessive losses; Hudson suspended operations at three mines; Lehigh Valley placed Dorrance colliery on a standby basis, and P&R mothballed for the time being Porter Tunnel and Newkirk colliery. With regard to the P&R suspensions, E. G. Fox, president of the company, pointed out that production would be maintained from lower-cost sources.

The outlook for anthracite for the balance of the year has improved, Mr. Fox said, as a result of the recent revision of the production-allocation plan, which should tend to stabilize the industry and lead to an improved price structure in the immediate future.

An improved first quarter for Glen Alden Coal Co. was reported by Francis O. Case, president, in releasing data as follows: Unaudited earnings for the first quarter of 1954 were $424,000 after depreciation and depletion charges of $586,000, compared with a net loss of $380,000 after depreciation and depletion charges of $595,000 in the first quarter of 1953.

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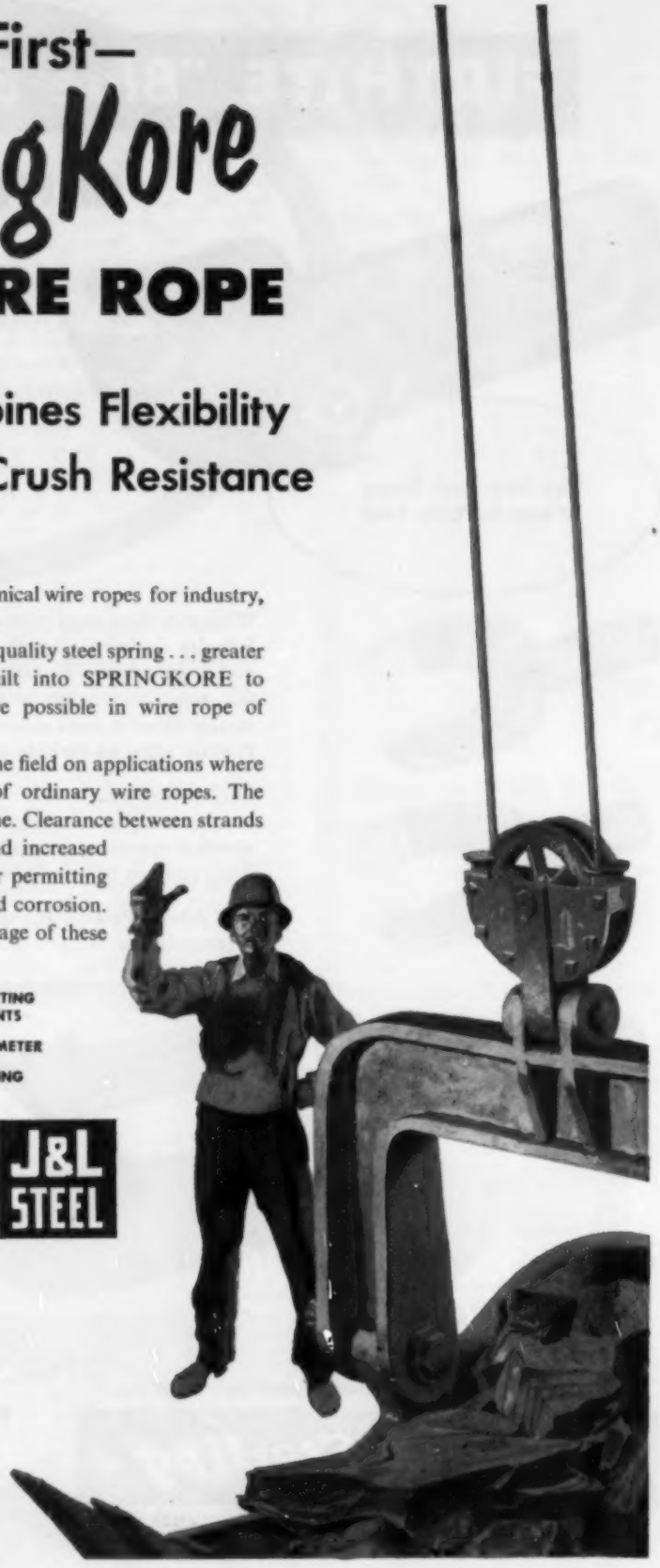

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Personal Notes

John L. G. Weysser, consulting mining engineer, Pottsville, Pa., has recently completed work in Korea as consultant to the United Nations Korean Reconstruction Agency in its program to increase coal mine production. He is presently engaged in studying Japanese mines.

Warren F. Leatherman, executive vice president, was elected president of the Crozer Coal & Land Co., and Page Coal & Coke Co., Philadelphia, at the annual stockholders' meeting, Apr. 29. He succeeds **Samuel A. Crozer,** who is leaving the industry to devote more time to his other business interests.

J. B. Warriner, long associated with the Lehigh Navigation Coal Co., is one of five named to receive Pennsylvania State University's 1954 Distinguished Alumnus award, June 12. Mr. Warriner was formerly president of Lehigh Navigation, and also had served as chairman of the Anthracite Board of Conciliation.

Eastern Gas & Fuel Associates has announced the following personnel changes in the accident prevention department at its southern West Virginia mines: **Charles K. Parker,** general safety inspector for the Beckley area mines, has been transferred to Keystone mine as plant safety inspector, succeeding **Guy D. Wilson,** who resigned. **R. J. Mars,** general safety inspector, has been assigned the Keystone, Kopperston No. 1, Kopperston No. 2, Wharton No. 1 and Wharton No. 2 mines. **G. D. Holmes,** general safety inspector, has been assigned the Morris Creek, Beards Fork, Page, Eccles No. 6, Stotesbury No. 8, and Stotesbury No. 11 mines. **Clint Shumate,** associated with the shaft department, has been appointed third-shift foreman, Stotesbury No. 8 mine, EG&FA, succeeding **Harvey Meadows,** who replaced **Grat Shumate,** resigned, on the German coal planer. **R. Rolfe Snyder** recently has been employed as resident engineer at Morris Creek mine, replacing **R. E. McLaughlin,** who resigned to accept employment in Texas. Mr. Snyder formerly was employed at several of the company's mines.

John W. Griffith has been appointed general superintendent, Chilton Hernshaw Coal Co., Clothier, Logan County, W. Va. Prior to joining the company 2 yr ago, Mr. Griffith had been associated with large producing companies in West Virginia, and with the U. S. Bureau of Mines.

Dr. Edward Steidle, dean emeritus, College of Mineral Industries, Pennsylvania State University, and chairman of the Federal Coal Mine Safety Board of Review, left last month on a 2-mo special assignment in Turkey to assist with recommendations of needs in development and reorganization of the Mining Research and Exploration Institute at the request of the Turkish government.

M. J. Donnelly, since 1949 superintendent of Mine No. 8 Peabody Coal Co., Tovey, Ill., has retired and has been succeeded by **A. Shimkus.** With the company for 13 yr, Mr. Shimkus was mine manager at Mine No. 8 until his appointment last fall as assistant to the field superintendent in charge of operations for the Illinois area.

Glen Alden Coal Co., Wilkes-Barre, Pa., has announced the resignation of **Marshall B. Nunlist** as vice president and controller. **G. Wilbur Nichols,** purchasing agent, has been named to succeed Mr. Nunlist as controller, and **Lester Diehl,** chief clerk in the purchasing department, has succeeded Mr. Nichols as purchasing agent.

W. J. Jackson, affiliated with the Lillybrook Coal Co., Beckley, W. Va., for 26 yr, has been appointed secretary-treasurer, Elkhorn Coal Co., Charleston, W. Va. Mr. Jackson will retain his position with Lillybrook as assistant secretary-treasurer. The Lillybrook Coal Co. offices have been moved to Lillybrook, W. Va., along with offices of the E. C. Minter Coal Co. and Amigo Smokeless Coal Co.

Kenneth Snarr has been appointed general manager of Uniontown Coal Mining Co., owned by Nashville Coal Co., Nashville, Tenn., succeeding **E. E. Steff,** who will manage the company's Stony Point mine. Mr. Snarr also is manager of Miners Coal Co., Madisonville, Ky., and Williams Coal Co., Mannington, Ky., both enterprises of Nashville Coal Co.

Paul Storrs, mine engineer, U. S. Fuel Co., Hiawatha, Utah, has resigned to accept a position with the U. S. Geological Survey, with headquarters at Salt Lake City. **Merlynn Anderson,** assistant engineer, has been named to succeed Mr. Storrs. Mr. Anderson joined U. S. Fuel in June, 1953.

At an organization meeting of the Lehigh Valley Corp., held Apr. 28 in Wilkes-Barre, Pa., **William Findlay,** vice president, Simpson Creek Collieries Co., was named first vice president and executive officer of Lehigh Valley Coal Corp., the operating subsidiary, and of Lehigh Valley Coal Sales Co., the sales subsidiary. **Eugene Schoener** was named treasurer of the two subsidiaries. **H. B. Wickey,** vice president in charge of operations, Lehigh Valley Coal Corp., and **J. A. Moss,** secretary-treasurer, were re-elected to those posts.

Ernest V. Bowman has been named superintendent, Riffe Branch No. 4 mine, Winding Gulf Collieries, Bluefield, W. Va., succeeding **J. A. Lewis,** who resigned, after 34 yr of service to the coal industry in southern West Virginia. Joining Winding Gulf in 1947 as chief engineer, Mr. Bowman held the position of superintendent, Goodwill mine, prior to his appointment.

Parton Heads LNC

W. J. PARTON, vice president since November, 1953, has been elected president of Lehigh Navigation Coal Co., Lansford, Pa., succeeding Glenn O. Kidd, resigned. Joining the company as a member of the engineering corps, Mr. Parton held various positions, becoming assistant to the general manager in 1948, and general manager in 1951. At a reorganization meeting of the company's board of managers, C. Millard Dodson, executive vice president, was elected president of The Lehigh Coal & Navigation Co., succeeding Robert V. White who was named chairman of the board. Formation of the Lehigh Navigation Coal Sales Co. was announced by Mr. Dodson following the meeting. Richard C. Newbold, formerly vice president in charge of sales, Lehigh Navigation Coal Co., has become president of the new sales firm.

Obituaries

Walter Hornsby, 60, mine superintendent, Glogora Coal Co., Blue Pennant, W. Va., died Apr. 19, in a Charleston hospital following a short illness. Mr. Hornsby had been an employee of Glogora for 19 yr.

George Bryan, inspector-at-large, New River Div., West Virginia Department of Mines, died May 2, in a Charleston hospital following an extended illness. Well known throughout the area, Mr. Bryan was at one time mentioned as a candidate for state mines chief.

Association Activities

Andes Heads Ohio Safety Group

Phil Andes, assistant safety director, Powhatan Mining Co., Cleveland, has been elected chairman of the mining section, All-Ohio Safety Congress, at a recent meeting in Columbus. Other officers

include John Douglas, safety engineer, Hanna Coal Co., vice-chairman; and Ronald C. Owens, secretary-treasurer, District 6, UMWA, secretary.

Utah Operators Elect Officers

At its annual meeting in Salt Lake City, Apr. 13, the Utah Coal Operators' Association elected the following officers: David A. James, vice president and general sales manager, Liberty Fuel Co., president; Oscar A. Glaeser, United States Fuel Co., vice president; and B. P. Manley, executive secretary. Directors elected were John Dorick, vice president and general manager, Hi-Heat Coal Co.; A. B. Foulger, general manager, Lion Coal Corp.; Mr. Glaeser; W. J. O'Connor, president and general manager, Independent Coal & Coke Co.; P. L. Shields, president, Spring Canyon Coal Co.; and L. R. Weber, president, Liberty Fuel Co.

Johnson Heads Ohio Coal Assn.

Stanley B. Johnson, president, The Lorain Coal & Dock Co., Columbus, Ohio, has been elected president, chairman of the board of directors and chairman of the Wage Scale Committee of the Ohio Coal Association. Whitney Warner Jr., Warner Collieries Co., was named vice president; E. H. Miller, secretary-treasurer, and Anna Lucht, assistant secretary-treasurer. Ezra Van Horn was named executive vice president for his 22nd consecutive year. The following directors were elected: Mr. Johnson; Mr. Warner; P. C. Beutel, Columbia Southern Chemical Corp.; W. D. Hamilton, Oglebay Norton & Co.; R. L. Ireland, Pittsburgh Consolidation Coal Co.; Merl C. Kelce, Broken Aro Coal Co.; and Harold E. Turner, Central Ohio Coal Co.

Air Pollution Group Elects

Gordon P. Larson was elected president of the Air Pollution Control Association at its 47th annual meeting, succeeding Thomas C. Wurts. Mr. Larson, who served as first vice president last year, is director of the Los Angeles County Air Pollution Control District, a position he has held since 1949.

Open-Pit Electrical Group To Hold 2-Day Meet at Hibbing

The 10th annual meeting of the electrical division of the Open Pit Mining Association, a group devoting its interest to the problems and developments in open-pit electrification, will be held at the Androy Hotel and Memorial Building, Hibbing, Minn., July 1-2. The opening day will be reserved for the presentation and discussion of papers on power distribution at coal and iron-ore pits, the geology and future of the Iron Range and the relationship between supervision and safety. The following day will feature a trip through the Mesabi Range.

Central Pennsylvania Elects

Officers of the Central Pennsylvania Open Pit Mining Association were re-elected at a meeting of the board of directors, as follows: president, J. H. Wallin; vice president, B. M. DuBois; secretary, R. S. Walker; and treasurer, Herman S. Moore.

Interior Reports on Synthetic Fuels

Synthetic-fuels processes demonstrated at USBM experimental coal-to-oil plants closed down last June "might have immediate economic value . . . for producing chemicals," Secretary of the Interior Douglas McKay told Congress May 6 in a report covering the Bureau's research on producing synthetic-liquid fuels from coal and oil shale during 1953. "In fact," he said, "the chemical industry is actually utilizing similar processes for making chemicals from coal."

Treating coal and oil shale in separate volumes, the Secretary's report describes in detail last year's scientific and technologic work. It includes discussions of final operations in the coal-to-oil plants at Louisiana, Mo., and in underground gasification of coal at Gorgas, Ala., which were discontinued in June, 1953.

There is general agreement that the country will find it necessary in the foreseeable future to supplement petroleum supplies with synthetic oil and "that the technology for the production of synthetic fuels from coal and shale should be developed at an early date," Mr. McKay said. Although potential oil production from important coal reserves is about 10 times as large, oil shale "probably will be used in first synthetic liquid fuels plants because of the appreciably lower cost," he reported. Current cost estimates indicate that motor fuel from oil shale may be competitive within a few years but much research and development is still necessary to insure operable processes and more reliable estimates, he pointed out.

Synthetic liquid fuels research last year emphasized fundamental laboratory and pilot-plant studies to improve known processes and develop new ones. Work on coal was conducted at Bruceton, Pa., and Morgantown, W. Va., and on oil shale at Rifle, Colo., and Laramie, Wyo. The report includes a summary briefly reviewing the year's accomplishments. Progress on coal-to-oil development includes:

At Bruceton, Pa.:

1. Laboratory experiments advanced a single-step hydrogenation process for obtaining high yields of gasoline directly from coal. A pilot plant is being modified to explore further the practical aspects of the new method, which may replace the present two-step process.

2. Massive iron catalysts, made from steel-plate turnings, proved exceptionally durable in converting synthesis gas to oil by the Fischer-Tropsch process. A hot-gas-recycle process employing these catalysts appears economically feasible because of the relatively low cost of recycling through a loosely packed bed of turnings.

3. Pilot-plant tests showed that a hot-carbonate process for removing carbon dioxide from synthesis gas under pressure requires considerably less steam than the method formerly used.

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, as follows:

Joy Mfg. Co.—Type 18HR2-2E loading machine; one 4-hp, two 7½-hp, and one 75-hp motors, 250 v, DC; Approval 2-892; Apr. 2.

Joy Mfg. Co.—Type 20BU1-4F loading machine; two 22-hp and two 5-hp motors, 500 v, DC; Approval 2-899A; Apr. 29.

Jeffrey Mfg. Co.—Type 76-A Colmol mining machine; three 50-hp motors, 440 v, AC; Approval 2-985A; Apr. 19.

Joy Mfg. Co.—Type "Lohite" rock-loading slide; 20-hp motor, 250 v, DC; Approval 2-991; Apr. 1.

Jeffrey Mfg. Co.—Type 61, Class 11 blower drive unit; 1½-hp motor, 230 v, DC; Approval 2-992; Apr. 13.

Goodman Mfg. Co. — Type No. 802049 water-pump unit; 3-hp motor, 250 v, DC; Approval 2-993; Apr. 21.

Lee-Norse Co. — Model CM-50 miner; two 40-hp, one 20-hp and two 8- or 10-hp motors, 250 v, DC; Approval 2-994; Apr. 30.

4. Inexpensive catalysts for the slurry-type Fischer-Tropsch synthesis were developed from readily available magnetite ores.

At Morgantown, W. Va.:

Research at Morgantown was aimed primarily at developing processes that will reduce the cost of manufacturing synthesis gas and hydrogen, major expense items in producing oil from coal by either the Fischer-Tropsch or coal-hydrogenation processes.

1. Development work showed that a process for gasifying coal at atmospheric pressure can be used by industry to make synthetic ammonia and other chemicals. A chemical company is incorporating several features developed in the Bureau's atmospheric-pressure pilot plant in a large-scale gasifier.

2. In experiments on gasifying pulverized coal under pressures of from 300 to 450 psi, large capacities per unit of volume of reaction space were attained. For processes requiring compressed synthesis gas, considerable savings can be achieved by gasifying coal under pressure, rather than generating the gas at atmospheric pressure and then compressing it.

3. Gas-purification studies developed an analytical method for determining carbonyl sulfide in the presence of carbon disulfide, ethyl mercaptan, and thiophene.

4. Experiments conducted in cooperation with industry determined the effect of sulfur on a nickel catalyst used in converting synthesis gas to methane for production of pipeline gas.

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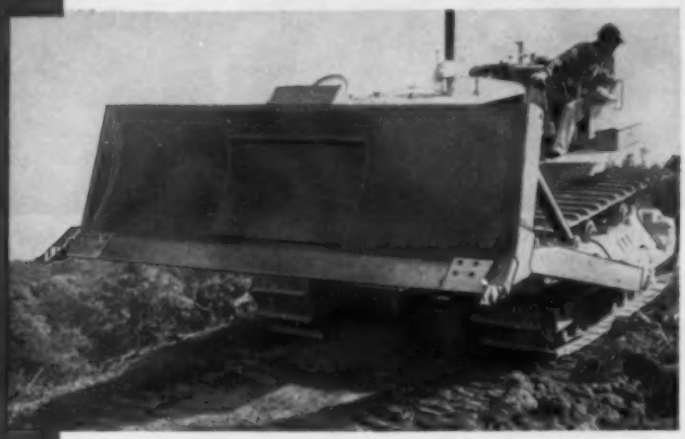

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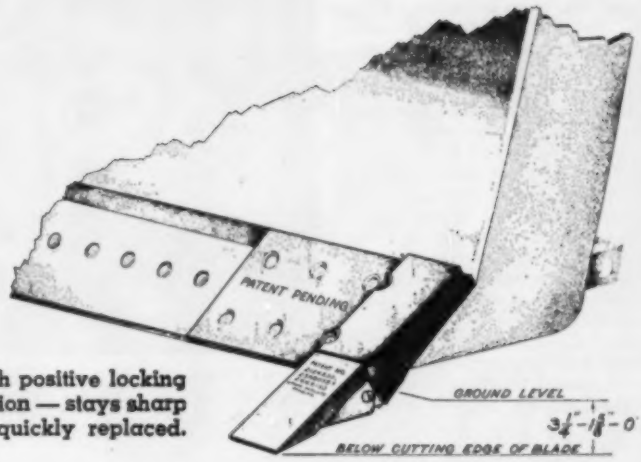
- Maintains slope on side cuts.

Corner adapter and replaceable point made of high alloy steel forging, heat treated for maximum wear and resistance to impact.

Bolted to bulldozer in standard end bit bolt holes — no welding or drilling needed.



H & L Point with positive locking flex-pin connection — stays sharp — easily and quickly replaced.

H&L TOOTH COMPANY
1540 SOUTH GREENWOOD AVE. MONTEBELLO, CALIF.

West Virginia Safety Conference Devotes Two Sessions to Coal Mining

ROOF FALLS were the principal targets in two of the eight papers presented April 15 at the two mining sessions during the 20th Annual State-Wide Safety Conference held in Charleston, W. Va., under auspices of the West Virginia Chapter of the National Safety Council. Ray Light, manager, Mine Lamp Div., National Mine Service, Beckley, was chairman of both sessions. Crawford Wilson, safety engineer, New River & Pocahontas Consolidated Coal Co., and vice chairman of the conference, introduced several of the speakers. The address of welcome was given by Col. R. W. Boyles, superintendent, West Virginia Department of Public Safety.

Papers presented during the morning session, and their authors, were: **"Labor's Views on National Coal Mine Safety,"** C. E. Jones, safety engineer, District 29, UMWA, Beckley; **"Importance of Eye Protection in Mining,"** Wm. J. Maher, Mine Safety Appliances Co., Pittsburgh; **"West Virginia Mine Fatalities,"** Frank B. King, chief, West Virginia Department of Mines, Charleston; and **"The Price of Being Without Public Relations,"** A. W. Pitney, vice president, M. K. Mellott Co., Pittsburgh.

AT THE OPENING SESSION of the Mining Section, West Virginia State-Wide Safety Conference—Seated: Ray Light (left), National Mine Service Co. and session chairman; Crawford Wilson, New River & Pocahontas Consolidated Coal Co., and vice chairman of the conference; A. W. Pitney, M. K. Mellott Co.; and Wm. J. Maher, Mine Safety Appliances Co. Standing: Col. R. W. Boyles (left), Department of Public Safety (W. Va.); Frank B. King, Department of Mines (W. Va.); and C. E. Jones, District 29, UMWA.

SPEAKERS at the second session—John A. Forsythe (left), Federal Coal Mine Safety Board of Review; C. E. Linkous, Island Creek Coal Co.; W. T. Park, Mt. Hope section, USBM; and H. A. Quenon, Eastern Gas & Fuel Associates.

"Good physical conditions in the mines, laws, codes and safety rules will only accomplish a moderate improvement in safety," said Mr. Jones in leading off the meeting. "The real improvement comes with training and instilling in each man a belief in safety."

During the present "readjustment period in the industry," Mr. Jones said, "We are now facing the most critical period affecting safety . . . If we are not very careful, the great gains made in safety could be wiped out in a very short time. If we listen to the 'rabble rousers' who are shouting that the coal industry is sick—if we listen to those few and become hysterical and lower our safety standards, then we will lose what ground we have gained."

Expressing his organization's gratitude to the state department, the USBM and mine owners for their splendid cooperation in making West Virginia mines a safer place to work, Mr. Jones pointed out that the union would "do everything possible to see that our safety standards are not weakened. On the other hand, we will cooperate to the fullest extent with the mine owners in maintaining the highest, safest economical production possible."

"Goggles cost less, in many districts, than the insurance credits they earn, and less for each pair than the most trifling eye injury," reported Mr. Maher. "In fact, their cost is so low that the finest goggle protection can be given to a thousand men for the cost of one eye made sightless."

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

Citing data from the USBLS and the USBM for 1951, Mr. Maher said that while the average frequency of eye injuries for all companies reporting was 0.67 per million man-hours, the average for mining companies was 4.85. In coal mines in 1951, eye injuries represented 7.3% of all disabling injuries.

"Although the easiest of all permanent injuries to avoid, eye losses are the most costly of all permanent disabilities . . . Few workmen realize that at the very least they are risking a 33⅓% cut in earning capacity for the rest of their lives every time they risk the loss of an eye," Mr. Maher stated.

Mr. Maher detailed the requirements of an effective eye-protection program, how the program should be set up, how it can be put across and kept going. Among the several outstanding examples he cited of successful coal mining programs was that of a West Virginia company which, over a 3-yr period, had a

64% reduction in the number of eye injuries and 80% reduction in eye injuries per million tons, cutting its compensation for such injuries 84%.

Mr. King, in analyzing West Virginia mine fatalities for the past 50 yr, displayed large colored graphs and charts showing totals and percentages by decades charged to five types of accidents. He was assisted in the presentation by A. F. Marshall, of the West Virginia Safety Commission, who prepared the graphs and charts.

Mr. King emphasized the high percentages of fatalities from roof falls and haulage over the years and how those percentages have mounted as fatalities from other causes have decreased. "Roof falls," he said, "are by far the greatest menace of the mining industry and always have been." In the first 3 mo of this year, there were 22 fatalities in West Virginia coal mines, 15 from roof falls, 5 from haulage and 2 from other causes. Investigations showed that every roof-fall accident was a result of inadequate timbering, he pointed out.

The industry still is paying a price for the deficits of the past, said Mr. Pitney. Emphasizing that "You must push for recognition when all you want is an even break," Mr. Pitney pointed to how government agencies and the UMWA have learned to enlist public support. The coal industry must be prepared to take advantage of its opportunities in placing its story before the public.

Among the principles involved in obtaining good public relations cited by Mr. Pitney were (1) a willingness to submit to public scrutiny, (2) a willingness to relate interests, (3) a willingness to compete for public acceptance, (4) an acceptance of all the tools available for display and communication, and (5) a recognition of rivalry with others, while at the same time maintaining respect for the competitor.

Referring particularly to safety, Mr. Pitney emphasized that statistics for public consumption should be positive, rather than negative. Instead of saying that deaths have been reduced by a certain figure, for example, report that a certain number of men are living because of improvements made in safety. He also suggested that coal companies use the term "safety failures" for internal communications instead of "accidents." Improvements in morale and attitudes can bring more safety progress than the latest safety gadgets, he said.

During the afternoon session, papers and their authors were: **"Some Practical Aspects of the Federal Coal Mine Safety Board of Review,"** John S. Forsythe, general counsel, Federal Coal Mine Safety Board of Review, Washington, D. C.; **"What the Island Creek Coal Co. and Pond Creek Pocahontas Co. Are Doing Now and Our Plans for Future Activities in Coal Mine Safety,"** C. E. Linkous, director of safety for the companies, Holden; **"The 1953 Coal Mine Fatality Record—A Challenge,"** James Westfield, chief, Health and Safety Div., USBM, read by W. T. Park, chief, Mt. Hope (W. Va.) section; **"Management's Views on National Coal Mine Safety,"** H. A. Quenon, division manager, Eastern Gas & Fuel Associates, Beckley.

In discussing the practical aspects of the Federal Coal Mine Safety Board of Review, Mr. Forsythe said that many operators have sought in error to appeal to the board from violations of the Federal Mine Safety Code over which the board has no jurisdiction. The coal Mine Safety Act with which the board is concerned is not a general mine-safety and health bill, he pointed out, but rather a mine-disaster law directed entirely toward prevention of five kinds of disasters: (1) mine fires, (2) mine explosions, (3) mine inundations, (4) man-trip accidents and (5) mine-hoist accidents.

Appeal to the board is a simple procedure, Mr. Forsythe emphasized. While not necessary, forms for appeal are available at USMB offices. A copy of the appeal application must be sent by registered mail to the USBM director in Washington so that the bureau may prepare its case to be presented before the board. The burden of proof lies with the bureau.

At the hearing, the applicant may introduce his evidence after the bureau has submitted its case. Each party is given a fair opportunity to present its side, since the statute provides that the board shall not be bound by previous findings of fact by the bureau or its representatives.

Outlining the safety activities of the Island Creek Coal Co. and Pond Creek Pocahontas Co., Mr. Linkous pointed out that the two companies operate 11 mines in Logan, Mingo, McDowell and Wyoming counties, West Virginia, and employ approximately 4,000 persons. Eight people devote their full time to safety, including a chief inspector, five safety inspectors, a secretary and the director.

Education, engineering and enthusiasm are the fundamentals of safety, Mr. Linkous emphasized. The most important activity is that of building enthusiasm, which is closely related to education, he said. The companies employ all the known activities and devices to further education and enthusiasm. Some of them listed by Mr. Linkous include:

(1) Pre-employment safety indoctrination requiring about an hour at a mine-rescue station; (2) specific instruction of the new employee in working in a safe manner, including providing him with copies of the company safety rules and mining law and obtaining his signature to an agreement that he will familiarize himself with both; (3) weekly safety meetings on each section at the beginning of the first work shift; (4) bi-monthly safety meetings for supervisors; (5) USBM Accident-Prevention Course; (6) bulletin boards, safety banners, posters, literature, films, payroll inserts and the like; and (7) monthly letters by the director of safety to supervisors and employees.

For the future, Mr. Linkous said, they are hopeful that in 1954 they can eliminate unsafe haulage practices. This year they began 100% first-aid training and additional training will be added, such as courses sponsored by the Department of Mines and the revised USBM 10-hr accident prevention course.

Rib and roof falls were the principal target in Mr. Westfield's paper, read

COAL MEN ON THE JOB . . .

WEST VIRGINIA COAL & COKE CORP., No. 5 mine, Omar, W. Va., day and second-shift supervisors (section foremen if not otherwise noted)—Front row: Gene Jordan (left), general night foreman; Elzie Munday; Steve Voreh; Howard Carter, chief electrician; Cecil Brown; Robert Smith, day dispatcher; Emery Killens, track foreman; Francis Cooper, safety inspector; William Cooke, safety inspector; Robert Brooks, night dispatcher; and John Kiraly, mine clerk. Back row: E. C. Workman (left), superintendent; T. H. Childers, maintenance and repair foreman; A. C. Rose, maintenance and repair foreman; John Nicinsky; William Nelson; Herman Myers; J. R. Rucker, night chief electrician; A. R. Bias; Sylvin Killens, track foreman; Luther Yates; Oscar Sizemore, motor boss; F. W. Lemore; and A. L. Royce.

by Mr. Park. Analysis of 225 rib and roof fatalities in 1953 showed: (1) human failures responsible for 88% of the total; (2) 71% occurred within 25 ft of the face; (3) 83% occurred between the last support and the face; (4) 29% occurred between noon and 3 pm and 14% between 8 and 10 am; (5) 30% occurred in places where temporary supports were not used; (6) average age of men killed in roof falls was 44 yr and their average experience was 22 yr; (7) 33 fatalities occurred while a foreman was on the scene; and (8) 20 fatalities occurred at faces and on haulage supported by roof bolts.

Of those 20 fatalities, Mr. Westfield stated, in no case was the accident the fault of roof-bolting. Either it occurred beyond the bolting or because of improper installation. Roof-bolting should not be considered a cure-all and the same safety precautions should be exercised under roof bolts as with conventional timbering, he emphasized.

Speaking from the management viewpoint, Mr. Quenon said that maintenance of morale is conceded to be one of management's major objectives and the full morale-building values of safety are not likely to be realized unless planned and supervised by the same executive who is responsible for industrial relations and personnel policies.

First among the factors to be considered in developing high morale is security in the job and a feeling that opportunities are not closed. Next, Mr. Quenon placed safe, sanitary and attractive working and living conditions. A third factor is appropriate goals, since a high level of morale is based on pride in workmanship, pride in product and satisfaction in the fruits of labor.

Safety activities that can contribute to improved morale include: (1) removing the fear of an accident, thus effecting a job insurance; (2) good housekeeping and improved housing which arouse and sustain pride in work and environment; (3) service on safety committees, attending meetings and discussions, acting to generate mutual respect; (4) general occupation training and foremanship training, developing pride in product and craftsmanship; (5) medical plans, physical examinations, first-aid training, etc., the natural accomplishments of safety work which add to happiness, contentment and morale; (6) publication of comparative accident statistics and emphasis on good records, to provide an objective, inspire team work and competitive spirit, and (7) organized safety activity, which gives management an opportunity to demonstrate personal interest in the employee. Management's willingness to spend money and devote executive time to protecting life and health inspires confidence, Mr. Quenon emphasized.

Among the Manufacturers

Sanford-Day Buys Brown-Fayro

Sanford-Day Iron Works, Knoxville, Tenn., has purchased the assets of the Brown-Fayro Co., which will be merged with the parent company and operated as the Brown-Fayro Div. of Sanford-Day Iron Works, with its headquarters continuing at Johnstown, Pa. The announcement was made jointly by P. S. McCallen, Sanford-Day president; and C. O. Crump, Brown-Fayro president. Mr. Crump continues as manager of the new Brown-Fayro Div. "The merger enables both companies to offer coal, metal and non-metallic mines a more complete line of equipment," the joint announcement said. Sanford-Day has devoted its entire capacity for over 50 yr to the production of mine cars and wheels. Brown-Fayro has for almost 40 yr manufactured room, rigging, car-spotting and car-moving hoists, mine pumps, and other haulage and mine equipment. Merger of the two companies and acquisition of the Johnstown, Pa., plant follows a plant modernization program at Knoxville that included the installation of the most modern macnines available for building steel mine cars and accessory equipment, the company reports.

Sweazy Joins Long Co.

W. B. Sweazy, formerly associated with several coal companies, has joined the Long Co. as mining engineer, with headquarters in Oak Hill, W. Va. In addition to sales work, Mr. Sweazy will be available for consultation on the application and maintenance of Long "Piggyback" mining units. Mr. Sweazy's previous experience includes positions as general superintendent, Maryland New River Coal Co.; general superintendent, C. H. Mead Coal Co.; underground mechanization supervisor, Powhatan Mining Co., Hanna Coal Co. and New York Coal Co.

Pittsburgh Gear Appoints

Pittsburgh Gear Co., a subsidiary of Brad Foote Gear Works, Inc., Pittsburgh, has named J. E. Mullen general sales representative, as part of a general sales plan to offer customers the combined sales staffs of both companies to serve their gear requirements. Mr. Mullen will continue to represent Brad Foote Gear in Ohio and western Pennsylvania, with headquarters in Erie, Pa.

Athey Makes Executive Changes

Athey Products Corp., Chicago, has announced several new executive positions as a part of its program to meet a rapidly expanding market for its broadened line of equipment. W. D. Lease has been elected vice president, sales; R. W. Kling, vice president, engineering; and C. E. Matthews, vice president, service and parts. Mr. Lease, who joined the company in 1946, has served Athey in recent months as manager of sales promotion, and has also been district representative and manager of research and development.

Westinghouse Elects Officers

Westinghouse Electric Corp. has elected three vice presidents: Walter J. Maytham, Pacific Coast regional manager, apparatus divisions; Dale McFeatters, director of information services for the corporation; and Otis O. Rae, southeastern regional manager of the apparatus divisions. Mr. Maytham has held various sales and executive posts with Westinghouse for the past 28 yr. Mr. McFeatters joined Westinghouse as director of employee information in 1945, and Mr. Rae has been with the company since 1919.

AC Makes Division Changes

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has made the following appointments in its General Machinery Div. staff: O. V. Tally, director of industrial sales; J. S. Morgan, director of utility sales; and W. L. Manly, director of general purpose equipment sales. Formation also was announced of a new Northwest region, under the management of M. M. York, formerly New England regional manager, including the Chicago, Milwaukee, Minneapolis, Duluth, Davenport, Des Moines, Peoria and Rockford offices, with headquarters in Chicago. J. H. Burrus Jr., Milwaukee district office manager, has been named manager of the Midwest region, with headquarters in St. Louis. He succeeds Mr. Tally, who had held the post since 1950.

Wemco Names Sales Engineer

David L. Springston has been appointed sales engineer for the Wemco Div., Western Machinery Co., with headquarters at Columbus, Ohio. Mr. Springston, a chemical engineering graduate of West Virginia University, will be in charge of the territory covering Ohio, West Virginia, western Virginia, and eastern Kentucky.

Pangborn Increases Staff

Pangborn Corp., Hagerstown, Md., has announced the addition of Eric J. Fanton and Harry N. Patronik to the engineering staff of its dust-control department and at the same time reported expansion of the department to double its previous floor space. Mr. Fanton, who spent 16 yr with Dallow, Lambert & Co., Ltd., one of England's leading manufacturers of dust-control equipment, was dust-control design and development engineer for Pangborn prior to his appointment. Mr. Patronik was associated with Whiting Corp., Harvey, Ill., prior to joining Pangborn.

Youngstown Names Chicago Head

Youngstown Sheet & Tube Co., E. Chicago, Ind., has named Arch J. Cochrane manager of Chicago district operations succeeding B. M. Stubblefield, who has retired. Mr. Cochrane, who has been assistant manager for 3 yr, held various posts with other midwest steel companies before joining Youngstown in 1951.

AAF Names Field Manager

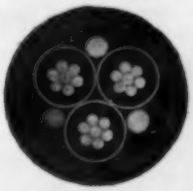
American Air Filter Co., Inc., Louisville, Ky., has named John W. Frazier field manager, air-filter sales, with head-

Underwater operation holds no peril for these Hazacord cables. Skid mounted junction box contains four 400 amp. circuit breakers . . . single cable leads from transformer bank; four branch circuits go to the control house near the shovel (below). The 500 horsepower motor which operates the pit-pump used for pumping the phosphate-bearing matrix to the washer also gets its power through Hazacords.

Hazard's exclusive ZBF sheath—cured under pressure in a continuous metal mold—is one reason why Hazacord cable can take the rough treatment it gets being dragged over this rugged Florida terrain.

Grabbing 17 yards of phosphate rock in a single bite, this enormous dragline supplies raw material for fertilizers and chemicals produced by the Virginia-Carolina Chemical Corporation. Power is furnished by thousands of feet of Type SH-D, 5000-volt Hazacord cable.

V-C CHEMICALS SELECTS LONG-LIVED HAZACORD SHOVEL CABLES FOR RUGGED PHOSPHATE MINING OPERATION



Hazacord Type SH-D was used exclusively by V-C for this important mining job. The safest and most widely used type for high-voltage work, Hazacord Type SH-D has copper shielding braid over each insulated conductor . . . grounding conductors in the interstices. For use up to 15000 volts.

On *every* job . . . from a giant dragline to a portable electric saw, Hazacords are setting new standards for long, economical service from cords and cables. Get complete information from your Hazard representative, your jobber or write to us today. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

HAZACORD *Mold-Cured* ***portable cables***

Third Stonega Mine Completes 100% Training

MINE OFFICIALS, state, federal and UMWA representatives participated in ceremonies marking completion of 100% training in the USBM Accident-Prevention Course by employees of the Roda colliery, Stonega Coke & Coal Co., Roda, Va.

Shown at the meeting staged by the company April 24 are: T. J. Liddle (left), company safety engineer; Rev. Herndon Shephard, pastor of the Roda church; C. J. White, general mine foreman, Roda No. 5 mine; W. M. Nidiffer, general mine foreman, Roda No. 3; W. H. Tomlinson, chief, Accident Prevention and Health Div., USBM Region VIII; F. A. Cress, USBM mine inspector; J. L. Gilley, chief, Norton (Va.) office, USBM; E. F. Fullen, assistant state mine inspector, Virginia Div. of Mines; Irven Carty, president, Roda local, UMWA; B. E. Polly, company production manager; W. C. Schott, Stonega general manager; Allen Condra, president, UMWA District 28; and E. M. Smith superintendent, Roda colliery.

Mr. Liddle served as master of ceremonies and Mr. Schott made the address of welcome. Presentation of Bureau certificates were made by Messrs. Tomlinson, Gilley and Cress, and Mr. Condra presented the UMWA certificate. Early last fall similar ceremonies were held to mark completion of 100% training by employees at the company's Crossbrook and Derby collieries.

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quarters in Pittsburgh. He has served as general sales manager, Trion, Inc., McKees Rocks, Pa., for the past 7 yr. The election of C. A. Pickett as vice president of the Illinois Engineering Co., Chicago, also has been announced. Mr. Pickett served as general manager of Illinois Engineering since the company was acquired by American Air Filter in 1953. John Hellstrom, vice president and director of sales of American Air Filter Co., and Mr. Pickett were also elected directors of Illinois Engineering.

Gar Wood Promotes Four

Gar Wood Industries, Inc., Tractor Equipment Sales, Wayne, Mich., has announced four appointments. D. R. Hetrick, formerly assistant to sales manager, has been appointed district manager for Michigan, Ohio, Indiana, Illinois Wisconsin, Kentucky, western Pennsylvania and Ontario. K. W. Chaffee, previously on the sales promotion staff, has been appointed district manager for Virginia, Maryland, Delaware, New Jersey, Washington, D. C., eastern Pennsylvania, New England and parts of Canada. District manager in the West is M. A. Staben, who has been with Gar Wood since August, 1953. He formerly was a district manager for the Industrial Div., Oliver Corp. New assistant to sales manager, tractor equipment sales, is R. H. Worpell. Gar Wood's Findlay Div. has named A. M. Guthrie assistant sales manager. Mr. Guthrie formerly was Findlay district manager for the West Coast. The Findlay Div. also has appointed the C. C. Fuller Co., Chicago, a distributor for counties in northern Illinois and northwest Indiana.

Dutney Joins Nordberg Mfg.

Nordberg Mfg. Co., Milwaukee, Wis., has appointed George V. Dutney special assistant to the president, with headquarters in the company's New York Office. For the past 12 yr, Mr. Dutney has been on the Johns-Manville headquarters staff in New York as manager of sales to the steel, non-ferrous and special industries. He joined Nordberg April 1 and will be the special representative of the president in sales and special public relations throughout the country.

New Denver Firm Opened

Harco, a Rocky Mountain area firm specializing in the sale of contractors' and mining machinery, has been organized in Denver, Colo. G. R. Harris, formerly president and director of Hayden Coal Co. and one of the founders of Potash Co. of America, is president of the new company; and A. Roy Wicker, active in machinery sales for the past 40 yr, and recently with the H. W. Moore Equipment Co., is vice president and sales manager. The firm will be distributor of heavy construction equipment for Joy Mfg. Co. and will sell wire, cable, Ford tractors and other industrial supplies. Sales offices will be at 1340 S. Lipan St. and executive offices at 917 First National Bank Bldg.

Clark Names New Distributors

Construction Machinery Div., Clark Equipment Co., Benton Harbor, Mich., has appointed new dealers for its "Michigan" line of power and tractor shovels, as follows: George G. Anderson & Co., Inc., 14900 Myrtle Ave., Harvey, Ill., for the Chicago and northern Illinois area; Western Machinery Co., 2400 W. 7th Ave., Denver, Colo., for the state of Colorado; Western Machinery Co., 124 E. Buchanan St., Phoenix, Ariz., for the state of Arizona; Western Tractor & Equipment Co., 2230 1st Ave., S., Seattle, Wash., for Alaska and parts of Washington, Idaho and Montana; and Foulger Equipment Co., 1361 S. 2nd West St., Salt Lake City, Utah, for the state of Utah and parts of Idaho and Wyoming.

Morse Chain Expands Sales

Morse Chain Co., Detroit, has announced the expansion of the nationwide sales organization. A new Midwest sales territory has been established to assist present Morse representatives and 23 distributors in the area. C. B. Lane, who will head the new midwestern sales office in Overland Park, Kans., was formerly with the Noelling Steel Sales Corp. R. J. Donachie has been named manager of the Philadelphia office, which will occupy new larger quarters at 9 Union Ave., Bala-Cynwyd, Pa. Mr. Donachie was formerly an industrial salesman for Philadelphia Gear Works. Appointment of Power Transmission Equipment Co., 1245 W. Fulton St., Chicago 7, as an exclusive Chicago area distributor, also was announced.

IH Makes Truck Changes

International Harvester Co., Chicago, has promoted T. E. Aughinbaugh to assistant manager of sales, southern region, for the motor-truck division. Mr. Aughinbaugh, who was assistant district sales manager at Indianapolis, will make his

MEETINGS

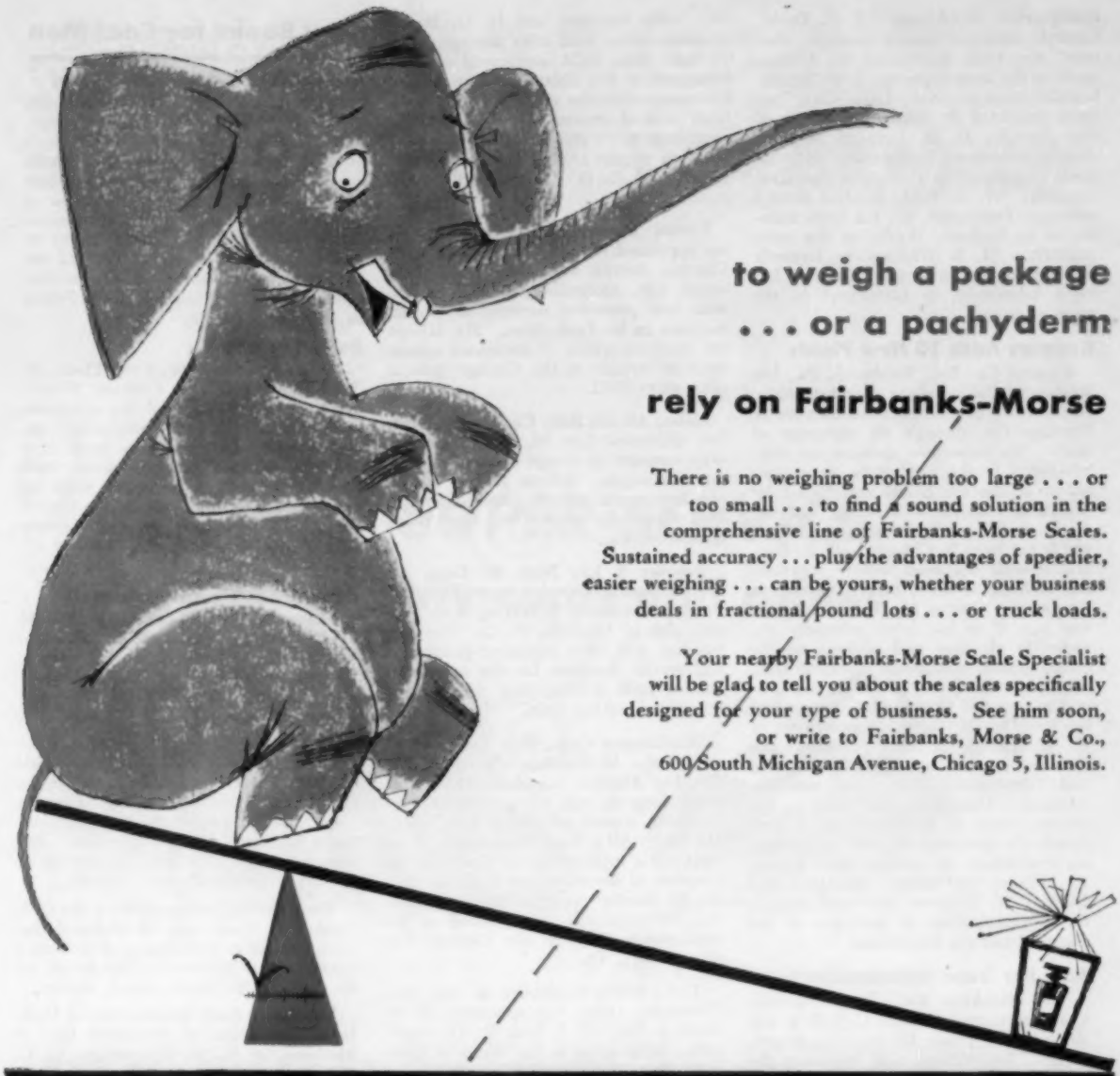
American Retail Coal Association: Annual Meeting, June 15-16, Sheraton-Gibson Hotel, Cincinnati, Ohio.

American Coal Sales Association: Annual Meeting, June 23-27, Hotel Broadmoor, Colorado Springs, Colo.

Mine Inspector's Institute of America: 44th Annual Convention, June 28-30, William Penn Hotel, Pittsburgh, Pa.

Rocky Mountain Coal Mining Institute: Annual Meeting, June 28-30, Denver, Colo.

Open Pit Mining Association, Electrical Div.: 10th Annual Meeting, July 1-2, Andrey Hotel, Hibbing, Minn.



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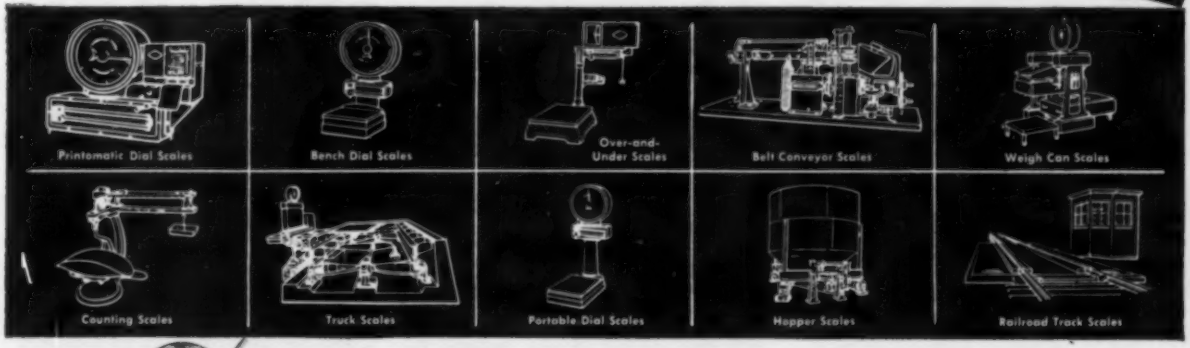

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RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

headquarters at Chicago. J. E. Davis, formerly assistant district manager, Detroit, has been transferred to Indianapolis in the same capacity. J. W. Briggs, branch manager, Salt Lake City, has been promoted to assistant manager of that district. D. M. Leonard, assistant district manager, Springfield, Ill., has been transferred to Detroit in the same capacity. W. L. Topf, assistant district manager, Davenport, Ia., has been transferred to Spokane, Wash., in the same capacity. M. S. Whittington, formerly assistant district manager, Spokane, has been transferred to Davenport in the same capacity.

Koppers Adds 10 New Plants

Koppers Co., Inc., Pittsburgh, Pa., has announced the purchase of substantially all the stock of the American Lumber & Treating Co. through an exchange of stock. No immediate changes are contemplated in the production or organization of the ten plants maintained by American Lumber & Treating, but the A. L. & T. headquarters organization, which has been in Chicago, will be integrated with the headquarters organization of Koppers Wood Preserving Div. in Pittsburgh. George M. Walker, who for the past 2 yr has been primarily engaged in planning and advising on the future growth of Koppers Chemical Div., has been named vice president and general manager of that division, succeeding the late Dan M. Rugg. Appointment of H. A. Denny as vice president and assistant general manager, Engineering and Construction Div., also was announced. Named to new posts in the division were A. B. Fisher Jr., a divisional vice president who will be general superintendent of construction; George P. Wilson, production manager; and Richard W. Vollmer, who will assume the responsibilities of manager of the chemical and gas department.

And For Your Information . . .

The Skookum Co., Inc., Portland, Ore., has named Howard C. Wilson and Richard W. Lyons to its sales department. Mr. Wilson will represent the company in nine western states and Mr. Lyons will cover Oregon and California.

R. F. Allen has been elected a vice president of H. K. Porter Co. of Pittsburgh, Inc., in charge of its Buffalo Steel Div. Joining Porter earlier this year as assistant to the executive vice president, Mr. Allen previously had been president of Stansteel Corp. W. Harvey Thompson has been named to succeed Mr. Allen. Before joining Porter, Mr. Thompson was vice president of Standard Instrument Corp., New York.

Reliance Electric & Engineering Co., Cleveland, has named H. Bigelow Moore to the staff of the Philadelphia district sales office as sales application engineer. Mr. Moore, who joined the Reliance organization last fall, previously headed industrial sales for the Nickel Cadmium Co., Pittsburgh.

Engineering Products Div., Radio Corporation of America, Camden, N. J., has appointed E. J. Hart microwave equipment sales manager and H. G. Boyle communications field sales manager. At the same time, RCA announced the appointment of five district sales managers for communications equipment: Bernard Gest, central region; K. R. McHenry, southwestern region; D. B. McKey, southern region; D. L. Pearlston, eastern region; and D. O. Reinert, northeastern region.

United States Steel Corp., Chicago, has appointed Warren F. Hjerpe assistant Chicago district manager, U. S. Steel Supply Div., succeeding Earl L. Simanek, who was promoted recently to district manager in St. Paul, Minn. Mr. Hjerpe has been supervisor of personnel administrative services in the Chicago general office since 1952.

Galion Allsteel Body Co., Galion, Ohio, has appointed Leo M. Brown western sales manager in charge of sales west of the Mississippi. Before joining Galion, Mr. Brown was sales manager of the St. Paul Hydraulic Hoist Div., Gar Wood Industries, Inc.

Brunner & Lay Rock Bit Corp. has begun construction of a new plant and warehouse totaling 20,000 sq ft on a 5-acre plot in Asheville, N. C. The new building will offer expanded production and service facilities for the company's line of rock drilling, clay digging and concrete breaking tools.

Worthington Corp., New York, has acquired the Mullenbach Electrical Mfg. Co., Los Angeles, manufacturer of electrical controls and equipment, through its wholly owned subsidiary, the Electric Machinery Mfg. Co., Minneapolis. Representing a further step in Worthington's program of diversification in fields offering the greatest opportunities for growth, the company will be operated as the Mullenbach Div. of the Electric Machinery Mfg. Co.

The Electric Controller & Mfg. Co., Cleveland, Ohio, has appointed H. C. Guire & Co., 715 S. York St., Denver 9, Colo., sales agent in the states of Colorado, New Mexico and Wyoming.

Baldwin-Lima-Hamilton Corp., Construction Equipment Div., Lima, Ohio, has appointed Bradley Equipment Co., 1042 W. Marietta St., N. W., Atlanta, Ga., distributor for Lima equipment in the central and northeastern portion of Georgia. The company also has named Innes Equipment Ltd., 930 Millwood Rd., Toronto, as Canadian distributor for Lima products, covering part of Ontario and Quebec.

Republic Steel Corp., Cleveland, will increase the capacity of its South Chicago seamless tube mill by nearly 70% with the addition of new facilities for rolling small-size seamless tubing. Work already has begun on the addition, and is expected to be completed in the spring of 1955. Capacity of the seamless tube mill will be increased from 186,000 to 312,000 tons a year, and the new facilities will help it better serve its customers of tube and pipe products, Republic points out.

New Books for Coal Men

Using Slotted-Type Roof Bolts

Anchorage Testing of Mine-Roof Bolts, Part I: Slotted-Type Bolts, by A. J. Barry, L. A. Panek and J. A. McCormick. Here's how to tell whether slotted-type roof bolts are well anchored in sandstone or shale roof. Tests indicate that this type of bolt can be installed so that it remains firmly anchored under loads up to its yield point. USBM, R. I. 5040. *12 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Better Welding

Metals and How to Weld Them, by T. B. Jefferson and Gorham Woods. Written for students, welding operators, supervisors, instructors, engineers, designers and managers, this book is a combination text and reference work showing how to make better welds at lower cost. *322 pp. $2 in the United States; $2.50 elsewhere. James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.*

Other Books and Booklets

Increased Thermal Efficiency of Solid Fuel Through Gasification: Technical Progress in the U. S. A. and in Europe. 106 pp. 6x9½-in; paper. $1.50. Organization for European Economic Cooperation, Publications Office, 2002 P St., N.W., Washington 6, D. C.

Performance of Typical Alberta Coals in a Rotating-Grate Domestic Stoker, by J. S. C. Dunn and W. A. Lang. Circular No. 17. 29 pp plus appendix. 8½x11-in; paper; mimeo. No price quoted. Research Council of Alberta, University of Alberta, Edmonton, Alta., Canada.

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.

Laboratory-Scale Investigation of Catalytic Conversion of Synthesis Gas to Methane, by H. W. Wainwright, G. C. Egleson and C. M. Brock. R. I. 5046. 10 pp.

Operation of a Powdered-Coal Gasifier at Louisiana, Mo., by R. G. Dressler, H. R. Batchelder, R. F. Tenney, L. P. Wenzell Jr. and L. L. Hirst. R. I. 5038. 35 pp.

The Mechanism of Ignition of Firedamp by Explosives, by R. L. Grant and C. M. Mason. R. I. 5049. 8 pp.

A New Method of Measurement of the Incendivity of Explosives to Firedamp, by R. L. Grant, C. M. Mason and G. H. Damon. R. I. 5050. 4 pp.

Factors Affecting the Incendivity of Permissible Explosives, by N. E. Hanna, J. E. Tiffany and G. H. Damon. R. I. 5051. 11 pp.

Laboratory Explosibility Study of American Coals, by Irving Hartmann, Murray Jacobson and R. P. Williams. R. I. 5052. 8 pp.

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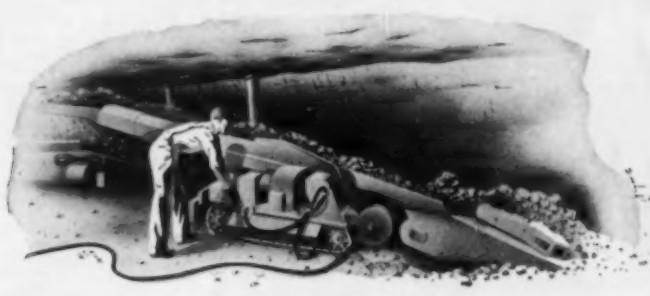

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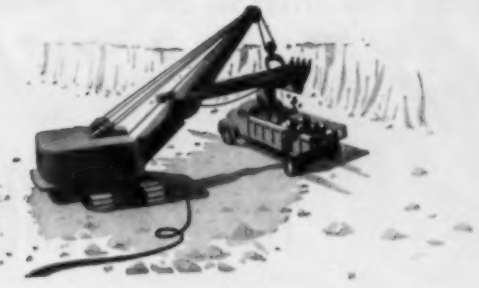

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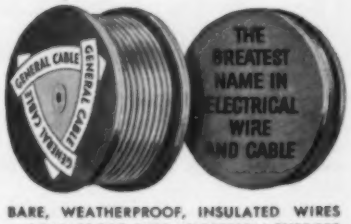

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• Obsolescence losses due to possible new continuous miner developments are held to a minimum.
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CHARLEROI, PA.
Write today for complete facts on converting your track mounted equipment.

Prevent Propagation of Explosions, by Irving Hartmann, John Nagy and F. P. Christofel. R. I. 5053. 7 pp.

Lessons From Intensive Dust Sampling of a Coal Mine, by Irving Hartmann, John Nagy and J. K. Rauschenberger. R. I. 5054. 12 pp.

Portable Methane-Detecting Appliances Approved Under United States Bureau of Mines Standard, by E. J. Gleim. R. I. 5056. 6 pp.

United States Bureau of Mines Standard for Inspection and Test of Explosion-Proof Enclosures for Mining Equipment, by E. J. Gleim. R. I. 5057. 7 pp.

Preparation Facilities

Jamison Coal & Coke Co., Hostetter mine, Hostetter, Pa.—Shipment by Deister Concentrator Co. of 16 No. 7 Super-Duty Diagonal-Deck coal washing tables and one Model 108 Concenco revolving feed distributor arranged for 16-way feed distribution.

Peerless Coal & Coke Co., Peerless No. 4 mine, Vivian, McDowell County, W. Va.—Contract closed with Nelson L. Davis Co. for additional vibrating screens sizing raw ¼-in coal, a new inclined raw-coal flight conveyor, cyclone thickeners, a new rotary breaker and a Neldco No. 1010 submerged-feed heavy-media assembly; 6x⅛ to be treated in heavy media and ¼x0 in existing air-cleaning plant; raw-coal feed to plant to be 545 tph, of which 260 tph will go to existing air-cleaning plant; feed to heavy media will be 320 tph, consisting of 286 tph of 6x¼ raw coal, 25 tph of ¼x⅛ air-cleaning plant middlings and refuse, and 9 tph of heavy middlings crushed and recirculated.

Emerald Coal & Coke Co., Emerald mine, Clarksville, Pa. Contract closed with Heyl & Patterson, Inc., for water clarification system of 8 manifolds of 3-in cyclone thickeners to close the circulating water system.

Amherst Coal Co., Dana mine, Rensford, W. Va.—Contract closed with Heyl & Patterson, Inc., for 36-in Reineveld fine coal drier and accessories, to handle 50 to 55 tph of ⅜x28M coal.

Sunnyhill Coal Co., New Lexington, Ohio—Contract closed with Heyl & Patterson, Inc., for 36-in Reineveld fine coal drier and accessories, to handle ¼x28M coal.

Pompey Coal Co., Jessup, Pa.—Contract closed with Wilmot Engineering Co., for one 9-ft-diameter froth classifier with feed capacity of 20 tph to prepare Buckwheat No. 6 coal; auxiliary equipment consists of Denver Equipment Co. conditioner and two 14-in Heyl & Patterson cyclones.

Underkoffler Coal Co., Lykens, Pa.—Contract closed with Wilmot Engineering Co. for one Type A Simplex jig to prepare pea coal at feed capacity of 15 tph.

Reilly Contracting Co., Wiconisco, Pa.—Contract closed with Wilmot Engineering Co. for one 12-ft-diameter Wilmot Hydrotator-Classifier to prepare No. 5 coal at feed capacity of 65 tph.

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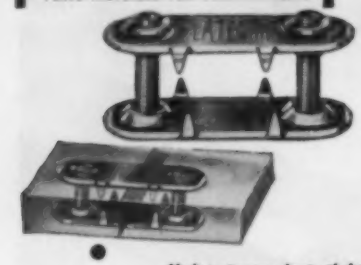

Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.

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AMC Coal Convention Report . . . Cont'd From p 108

These records also can show misapplication of the equipment and also abuse by operating crews.

4. Prevention rather than repair after failure. Avoid patchwork; it is false economy.

5. Correct tools.

6. Preparedness, plus careful analysis of each job to make replacements properly with a minimum of delay.

7. Proper lubrication, which today determines to a considerable degree the actual replacement and rebuilding cost with the majority of mining equipment.

In organizing for maintenance, Mr. Smith observed, the best arrangement is to have the maintenance foreman and his men report to the proper operating official, provided the operating department works with the maintenance group as it should. Preventive maintenance and running repairs are the responsibility of the mine staffs, but Mr. Smith declared that for overhaul and rebuilding, "a central shop is concentrated power."

In describing the Providence repair center (*Coal Age*, August 1951, p. 78), Mr. Smith pointed out these advantages of the central shop:

"It eliminates the interruptions so often experienced in the mine shop resulting from taking a man or a crew away from a major overhaul several times before completion. The central repair shop, with more and better equipment, is more able to develop specialized workmen, consequently saving man-hours and producing a better all-around repair job. The central shop also aids in the reduction of inventories because it permits the centralization of materials rather than the stocking of duplicate items at each colliery. The standardization of equipment is the most important factor when considering maintenance, and the inventory value of various repair parts must be considered."

"The Committee recommended the use of the grounded neutral system."

Where high-voltage circuits are taken into mines, said John A. Dunn, electrical engineer, Island Creek Coal Co., Holden, W. Va., the system recommended is similar to the low-voltage AC system recommended in the "Grounding and Circuit Protection System" report of the Underground Power Committee (*Mining Congress Journal*, July, 1951). That report recommended the ground-neutral system with a neutral resistor to limit current flow and potential drop across the machine frame if failure occurs, plus circuit breakers with ground-trip relays. Inherent features are:

A. The voltage difference resulting from a fault and to which a person might be exposed can be limited to a value not normally injurious.

B. With proper entrance circuit breakers equipped with the necessary instrument transformers and three or more induction overload relays to protect the cable circuit where it enters the mine, both phase-to-phase and phase-to-ground protection is provided, and faults can be cleared before much damage can result.

Offering detailed discussion of limiting ground current in a neutral system and suggestions for the use of circuit breakers and disconnect switches, grounding facilities and supplementary protective equipment, Mr. Dunn concluded with a discussion of high-voltage cable circuits.

Many types of circuits can be safely installed, but the Underground Power Committee is of the opinion that "The nonmetallic armored neoprene-jacketed cable with ground wires and shielded power conductors is far superior to any other type of high-voltage circuit for use in mines. This cable, used in conjunction with limited ground-current system and adequate protective devices, provides a high-voltage circuit that is

COAL MEN ON THE JOB . . .

BELL & ZOLLER COAL CO., Madisonville, Ky.—Stanley Williams (left), mine manager, and James Daves, unit foreman, Oriole mine; and George Blalock, mine foreman, Moss Hill mine.

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. . . with low cost Exide-Ironclad power!

YOU CAN count on Exide-Ironclads to help speed up car changes, keep loaders busy and main line haulage moving fast. This means you get more trips per shift, more production per man-hour with less cost per ton handled. Exide powered equipment will handle as much tonnage during the last hour of the shift as during the first. Lower costs for operation, maintenance and depreciation make Exide-Ironclad batteries your best power buy—AT ANY PRICE!

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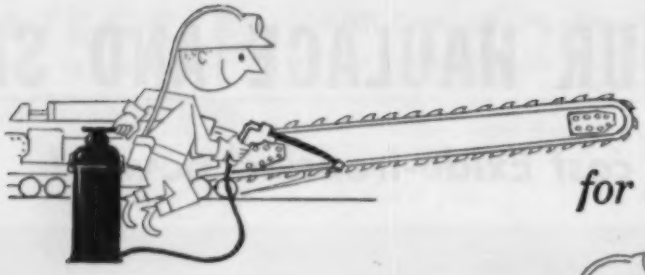
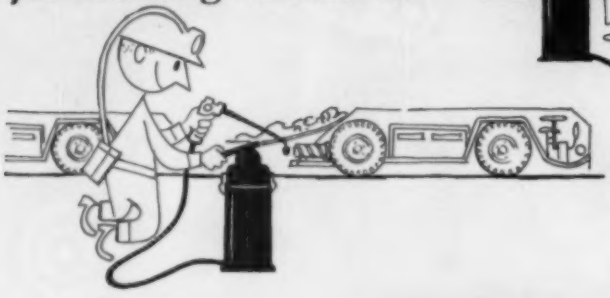


for cutting machines

for loading machines



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safe and well-adapted to the use." In general, high-voltage circuits should be installed in accordance with ASA "Safety Rules for Installing and using Electric Equipment in and Around Coal Mines."

"Many types of high-voltage circuits could be installed safely in our mines."

Concurring in the recommendation that the non-metallic cable with ground wires and shielded power conductors is the best for mine service, Thomas R. Weichel, mining-electrical engineer, Hazard Insulated Wire Works Div., The Okonite Co., Wilkes-Barre, Pa., noted that such cables have been successfully used for voltages up to 15 kv, though most requirements in the past have been for 5-kv service.

"It is suitable for installation in boreholes, shafts or horizontal runs in underground entries. It may be buried in a trench, placed on the mine floor or suspended on insulators. It is a semi-portable cable that may be moved easily and is, therefore, suited to modern high-speed applications requiring frequent moving of the equipment."

Installation and use of such cables were covered in detail by Mr. Weichel including: lightning protection, surface disconnecting switches, overload protection, types of cables for shafts, boreholes and underground service; cable suspension, support and protection in shafts and boreholes, installation in shafts and boreholes, underground installation, termination, splicing and couplers.

Use of semiconductor and paper tapes was one of the topics of discussion following the papers by Messrs. Dunn and Weichel, with the general conclusion that to prevent corona and other difficulties the semiconductor tape should be applied directly to the conductor but can be used over the insulation, and that paper tape under the shielding and over the insulation is likely to lead to trouble. C. C. Conway, of Chicago, concluded the discussion period with the statement that greater appreciation of the merits of nonmetallic cable was necessary and that all installations should be made carefully to facilitate wider use and thereby gain the advantages provided by the cable.

"As better lighting provides better seeing, the human seeing machine increases its productivity."

Results of the first experimental mine-lighting project carried out at the Owings mine of the Consolidation Coal Co. (W. Va.) by the Mining Development Committee of Bituminous Coal Research were summarized by Gerald von Stroh, MDC director, Huntington, W. Va. The experiment was carried on with the cooperation of the Nela Park Lighting Laboratory of General Electric, the American Steel & Wire Div of U. S. Steel Corp., the U. S. Bureau of Mines and the W. Va. Dept. of Mines. Out-of-pocket expenses were covered by a

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COAL MEN ON THE JOB . . .

WEST VIRGINIA COAL & COKE CORP., Omar, W. Va.—Left photo: M. D. Collier (left), general superintendent; H. W. Bauer, division manager; and H. D. Bowker, assistant general superintendent. Right photo: Lib Harris (left), shop mechanic; Eugene Cook, engineer; R. I. Bowling, shop foreman; and J. C. Johns, superintendent, Omar general shop.

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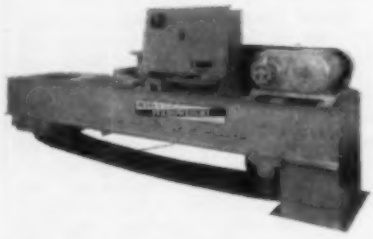

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$20,000 contribution by the Mine Safety Appliances Co.

The installation comprised circline fluorescent lighting fixtures hung on spads at 15-ft intervals throughout No. 1 section of Owings mine. Current was supplied by a 110-v 60-cy le MG set operating off the 250-v DC mine-power system. AC was used because equipment is more easily secured and also because a fluorescent tube operating on 400-cycle current can be arranged to be intrinsically permissible, thus greatly simplifying the ultimate permissible equipment. Special units included a special spotlight for the cutting machine.

The cost of duplicating the equipment used in the experiment, said Mr. von Stroh, would be $8,000. The system was operated at Owings for 6 mo, using approximately 200 12-in fixtures to illuminate approximately 1 mi of active openings—machine loading, shuttle-car haulage.

"Equipment, procedure and technique have been developed to the point where the light can be maintained in proper position with a consumption of 2-man-hours per shift. About every 2 wk an additional 4 man-hours are required to move and reconnect the generator and distribution system, coincidental with moving of the section loading point.

"Cost of supplies will average about $2 per shift; of this amount, $1.60 is for replacing broken tubes. Fixtures could be provided at slightly additional cost that would protect the tubes and reduce the breakage to practically nothing."

Having achieved the first objective—learning how to illuminate a section—the equipment was removed from the mine April 1. "To prove or disprove the value of mine lighting" is the objective of a second installation now projected for the Montcoal (W. Va.) mine of the Armco Steel Co. "It is our expectation," Mr. von Stroh concluded, "that over a period of not less than 6 mo a definite pattern will develop showing conclusively that the benefits of mine lighting will more than offset its cost. If such proves to be the case, the cost of developing permissible equipment to meet overall mining conditions will be justified."

Supplementing Mr. von Stroh's paper, Robert Dice, BCR project manager, presented a detailed account of the origin of the illumination project and the steps taken to arrive at the present system. These steps included trial of DC as a power source, and the development of a means of moving the equipment, including a flat-bed wheelbarrow for transporting fixtures and cables. At no time, he reported, were over 199 fixtures used in lighting the section at Owings mine.

Continuous Mining

With G. A. Shoemaker, executive vice president, Pittsburgh Consolidation Coal Co., presiding, eight speakers discussed six continuous mining units and two long-face units at the final technical session May 5.

Goodman Miner, J. W. MacDonald,

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You can extend the life of every cable in your mine by protecting them with Ruberoid Insulating Tape. Greater electrification in your mining operations means that cable maintenance and protection is more important than ever to you.

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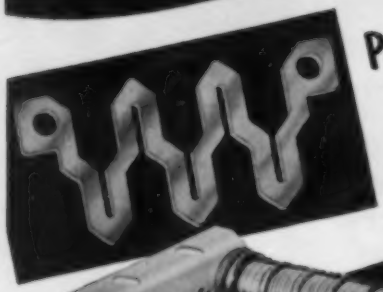

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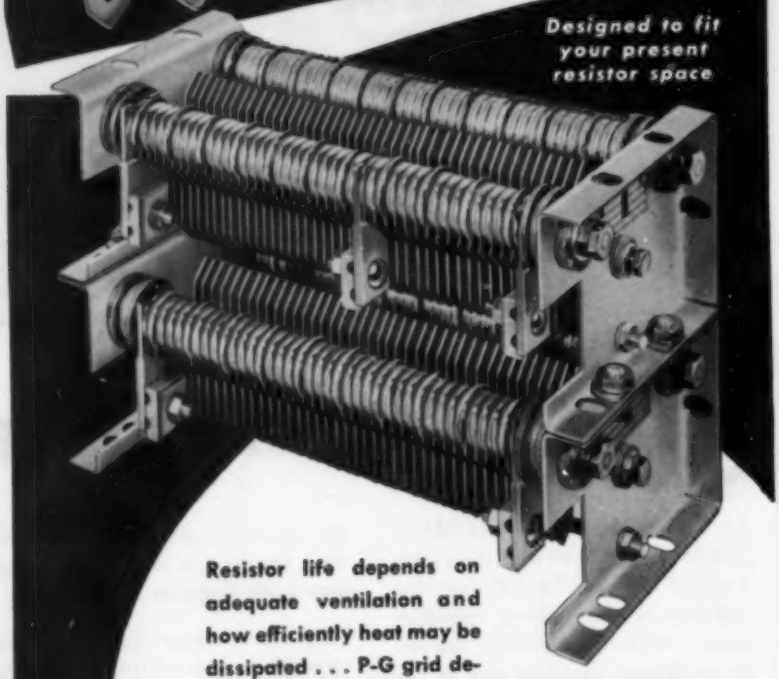

Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

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vice president, Old Ben Coal Corp., Christopher, Ill.—Reporting on initial experience with two Type 500 units, Mr. MacDonald said that even though the period was short it provided a basis for evaluation of results. Operation to date has been in entry work. One unit, as an example, produced 284 tons the first shift it worked April 8, but averaged 333 tons for the following month and 438 tons in the final week of the month. Better performance is expected when crews are trained and when room work is started.

A special assembly place 13½ ft high and 15 ft 4 in wide, equipped with a steel assembly frame and two 5-ton blocks, was used to put the machine together underground. The units are served with two 7-ton shuttle cars now, and a third unit will be added as a surge car. For 5,541 tons of output, bit cost has been 4.32c per ton. Peak horsepower has been 268, and the average with an advance of 10 in per min has been 218 hp. Size consist has been satisfactory, with a higher yield of coarse grades with higher rates of advance.

Jeffrey Colmol, E. M. Pace, superintendent, Inland Steel Co., Wheelwright, Ky.—Early experience with the Colmol in the Elkhorn No. 3 seam, said Mr. Pace, indicated that it could be best adapted to pillar mining. Hardness with little cleavage made pillaring preferable to use in entry work. Auxiliary equipment includes a Joy pickup loader, two shuttle cars and a CP drill for intermittent roof-bolting.

An angle pillar plan was first tried with short room centers. Among other disadvantages, this increased the number of pillar lifts. A second plan, with rooms at 90 deg, increased the length of the lifts and reduced the number of crosscuts. Pairs of places were driven on 25-ft centers with 8-ft pillars to divide the coal into 58 x 250-ft pillars, which were mined by lifts 70 to 80 ft long on angles of 45 to 60 deg with the rooms. The section had bad roof but rapid extraction prevented roof action until about 200 ft of the block had been mined. The pillars between pairs of rooms usually were mined by slabbing or splitting.

A modification of Plan No. 2 is used in a new section with better roof conditions. Centers in pairs of rooms were increased to 50 ft to provide increased extraction and two roads for shuttle cars. Size of the main blocks remained the same, and room haulage is favored in the new plan.

Joy Continuous Miner, R. C. Graham, superintendent, Saginaw Dock & Terminal Co., St. Clairsville, Ohio—Presenting the results of 4 yr experience in the 5½-ft No. 8 seam, Mr. Graham listed underground equipment as follows:

3JCM miners	5
6SC shuttle cars	10
7-ton dropbottom cars	50
6-ton locomotives	7
30-in belt conveyors	2
36-in slope belts	1
Supply trucks	1
Sand cars	1
Water boxes	1

Rooms 16½ ft wide on 22-ft centers, 300 ft long, are turned at 45 deg. Pillars are not recovered. Rooms are mined on one side of a 2,000-ft butt entry on the advance and on the opposite side on retreat. Face crews are made up of two timbermen, two shuttle-car operators and one miner operator. One shuttle car is stationed under the loading boom at all times as a surge car, and the second hauls to the panel belt. Average production per unit in room work is 250 tons per shift. Crews and procedure are substantially the same in entry work.

Two men on each shift handle supplies. Maintenance is handled by 5 mechanics and 1 greaser each shift. In the initial stages, the greatest delays resulted from hose breakage, cutting-motor water jackets, cutting chains and chute frames. Most have been eliminated by factory and mine changes.

Tons per machine-shift over the 4-yr period are as follows:

Nov-Dec., 1949	118.00
1950	179.40
1951	206.60
1952	206.50
1953	197.30

Konnerth Miner, R. C. Beerbower Jr., superintendent, Karen mine, U. S. Steel Corp., Brownsville, Pa.—Development of the Konnerth miner and its use in the 7-ft Pittsburgh seam at Karen mine were detailed by Mr. Beerbower (see p 76 of this issue).

Lee-Norse Miner, C. B. Tillson Jr., superintendent, Crucible Steel Co. of America, Crucible, Pa.—Development of the Lee-Norse miner at Crucible was outlined by Mr. Tillson. Coal thickness generally is 90 to 96 in. and cutting is moderately hard. Reject averages 9%.

The first machine was received in mid-June, 1951, and was wheel-mounted. It was returned for rebuilding in January, 1952, and a second revised miner, equipped with crawlers, was installed Oct. 17, 1952. It was returned for modification Sept. 8, 1953, and the improved model was put into operation in early March, 1954.

Development of butt entries in old working sections was the unit's first job, during which it was found that best results were attained by using a pickup loader and one or two shuttle cars. Bit cost in April was 7c per ton, and parts cost in the most recent survey was 41c per ton. The machine is now pillaring in an old section.

Marietta Miner, F. R. Zachar, general superintendent, Christopher Coal Co., Pursglove, W. Va.—Goals in the choice of the Marietta for use in the company's Pittsburgh-seam mine, said Mr. Zacher, were: low production of minus ⅜, high tons per minute, low overall operating and maintenance costs, a unit permitting use of any necessary roof support, and adaptability to the installation of line brattice.

In spite of careful study beforehand, said Mr. Zachar, a number of mechan-

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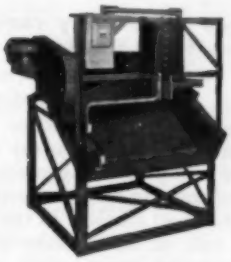
Send for Bulletin 119.



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COAL MEN ON THE JOB . . .

PITTSBURGH COAL CO., Montour 4 mine, Bridgeville, Pa. (left photo)—Walter Jaap (left), superintendent; John Furlong, mine foreman; Tom Arrigoni, Henry Cook, section foremen.

SOUTH-EAST COAL CO., Seco, Letcher County, Ky. (right photo)—Bill Combs (left), rodman; C. C. Hooper, chief engineer; Ardell Champion, assistant chief engineer; W. R. Preston, purchasing agent and maintenance superintendent; and W. R. Campbell, safety director, Underwriters' Safety & Claims Co.

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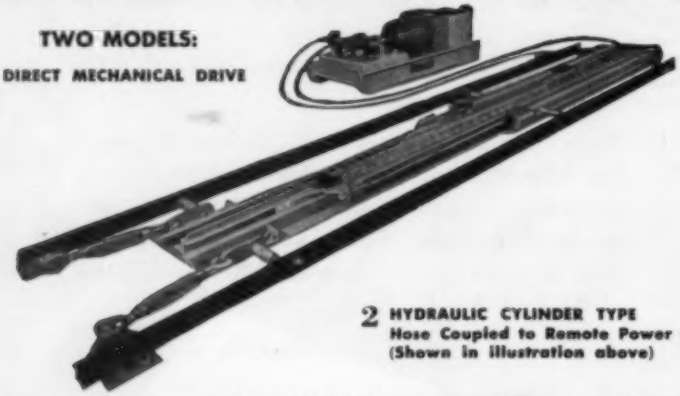

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ical troubles were encountered, and size consist of the output has so far been "somewhat disappointing." The roof action in the first section, which produced 81,000 tons of clean coal, was favorable, however. Except for losses in sulphur, average bit cost has been 4c per ton.

Production, said Mr. Zachar, has ranged from 800 tons down to zero per shift, the variations largely reflecting sulphur intrusions, the latter being the normal condition but not interfering much until machine mining was introduced. In the light of this, Mr. Zachar suggested, it perhaps is worthwhile to restudy coal-seam characteristics as a means of achieving better continuous-mining applications and results. In Christopher Pittsburgh-seam operations, for example, projection will be modified to permit quick and easy change from one type of mining to the other in accoradnce with changes in conditions.

Longwall Mining

The Loebbe Coal Planer, W. D. Hawley, division manager, Eastern Gas & Fuel Associates, Glen White, W. Va.—Two years of experience with the coal planer was summarized by Mr. Hawley. The initial installation was in a block 328 ft wide and 1,745 ft long in the 31- to 36-in Pocahontas No. 4 seam in Stotesbury No. 11 mine, in the course of which data on roof action and support were obtained, and the conclusions was reached that experience and expert handling is one of the major factors in control. The first panel produced 51,450 tons of clean coal in 93 working shifts, or 599 tons per shift. Equally good results were attained in subsequent panels.

The planer then was moved to No. 8 mine, same seam, but under thicker cover and a mined-out upper seam. Block size is 328 x 1,800, and a track was placed along the belt line for ease in handling men and supplies. The last full panel was completed in 170 shifts and produced 69,962 tons. Man-shifts involved totaled 5,316, and average tons per man was 13.16. Average face advance per shift was 10.9 ft. Maximum production in one shift was 699 tons; in one day (two shifts), 1,197 tons. Difficulties include quick undulations, which make it difficult for the plow to follow the seam, and friable top or soft bottom, which make breaking the top more difficult.

Samson Stripper, John S. Todhunter, mining engineer, Barnes & Tucker Co., Barnesboro, Pa.—In 2 yr of experience, the Samson unit has been modified in many details and has mined two blocks of coal, one 270 x 1,300 ft and the second 400 x 460 ft. A third face 300 ft wide and 1,300 ft long will start in May.

Stripping is preceded by topcutting with the cutter riding on the face conveyor. Mining is in the "B" seam 38 to 42 in thick, and haulage is by double-chain face conveyor, two 20-in single-chain flight conveyors and a 30-in belt conveyor.

Detailing the mining plan, roof support, and the safety and production advantages of longface mining, Mr. Tod-

Model 14.5 Twin Disc Fluid Coupling, shown mounted on 659-ft. conveyor drive at Panther Coal, handling 10 tons per minute. Available in Models 7.45 through 21", Fluid Couplings improve performance on motor- or engine-powered installation from ¾ to 600 hp. Ask for Bulletin 144-C.

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hunter concluded that: "In the process of mining two separate blocks of coal with the Samson stripper, it has been proved that longwall mining can be successfully done in the Lower Kittanning seam. With the initial experience of proving the system and stepping into production, the problems now confronted are those of improvement to get the maximum tonnage."

Stripping, Augering and Blasting

"Capacity of a truck body has little to do with ton-mile capacity, which is where the pay-off is."

"It is a popular misconception to rate a truck according to body size, but a much more accurate evaluation would be to use pounds of pay-load per horsepower or pounds of gross vehicle weight per horsepower as a yardstick," said Andrew Hyslop Jr., chief engineer, Hanna Coal Co. Mr. Hyslop led off at the stripping session Monday afternoon, with H. C. Livingston, vice president, Truax-Traer Coal Co., presiding.

Ton-miles per hour is also the yardstick to measure a truck's first cost as well as operating labor cost, Mr. Hyslop contended. These signposts point to the large-capacity engine as the key to low haulage cost. However, in using the 350- and 400-hp engines now available, it is hard to find transmissions and axles that will take the high torque without excessive maintenance. The best answer now appears to be in increasing truck speed.

In reducing the weight of shovel dippers, Hanna learned much about metals, stresses and design that has been helpful in reducing tare weight of trucks, Mr. Hyslop said. For example, a 61-yd semi-trailer hopper with side sheets of 16-gage steel, bottom of 12-gage and doors of 10-gage has been in operation for some 8 mo without serious difficulty. Likewise, use of alloy steels in heavy sections, such as, goose-neck and frame members, has cut weight of these sections up to 50% without loss of strength.

Problems of tire wear resulting from high speed and high loading now are being eased by higher-strength tire fabrics and hydraulic brakes, with the hydraulic system absorbing much of the braking heat, Mr. Hyslop said. Even so, tire costs amount to some 21% of total truck-operating cost, with the principal cost item being tread wear, which is closely related to road surface. With this in mind, Hanna now is experimenting with black topping for haulage roads.

Though engine maintenance amounts to 7% of total truck-operating cost, it is possible that a larger engine could improve ton-mile performance enough to offset the higher maintenance cost involved, Mr. Hyslop said. Manual-shift transmissions, operated by carefully trained drivers, now have replaced automatic transmissions because of high power losses charged to the latter.

Comments on Mr. Hyslop's paper were offered by L. E. Briscoe, electrical engineer, Ayrshire Collieries Corp., and E. J.

Dress, chief mining engineer, United Electric Coal Cos. Mr. Briscoe reported that tires on his company's large haulage units approximate 25% of the initial investment and 25% of total operating cost. To reduce tire cost through better maintenance, a well-supervised program has been set up in line with the manufacturer's recommendations. To make tire repairs easier and safer and reduce their cost, tire buggies have been devised to hold tires upright for removal or installation. Also a system has been devised for repairing tires without removing them from the wheels, Mr. Briscoe explained.

Mr. Dress reported the following changes made by United Electric in pursuit of higher efficiency and lower cost: (1) bigger and lighter engines and bigger haulage units; (2) increase in horsepower from 275 to 300, installation of fluid drive and stretching mileage between overhauls to 2,400 mi; and (3) reduction of speed to 32 mph, with savings in engine maintenance.

"We use a coal-recovery auger to mine coal that cannot be reached otherwise."

Wherever the coal seam extends 48 ft or more inside the highwall, auger mining after stripping seems economically feasible, said K. O. Shaner, assistant to the vice president, Mech Mining Co., Kittanning, Pa. When the auger immediately follows the stripping operation, no clean-up problems are involved in obtaining the 40-ft width needed by the auger. But when the auger is used in abandoned pits, the cut must be cleaned up to the necessary width. Using the McCarthy coal-recovery auger, with a 30-in cylindrical cutting head, carbide-tipped bits and eight 24-ft auger sections, the company recovers coal up to 196 ft from the face of the highwall, Mr. Shaner explained. The holes, drilled to leave a 5- to 12-in pillar for roof support, produce 40 tons of coal each. The hoist for lifting and placing the auger units has a steel fabricated boom 23 ft long. Auger sections are kept within easy reach on the bed of a truck.

All machinery units are completely mobile, self-propelled and rubber-mounted. The machine itself is equipped with a hydraulic tramming device, employing steel skids and horizontal and vertical steel jacks. All auxiliary operations of the machine are controlled by one man from a battery of hydraulic valves on the side of the machine. A helper moves all supporting equipment in the cut and runs the conveyor system. Two truck drivers round out the crew. To retract all auger sections from the hole and move the machine into position for the next cut requires 15 min; to drill a 196-ft hole, 60 min. One analysis of coal produced by the auger revealed the following: 14% plus 4-in; 18% 4 x 1¾-in; 24% 1¾ x ½-in; 44% minus ½-in.

In 1953, 229 augers of various types produced 5,808,000 tons of coal in the United States, said D. A. Zegeer, assistant to the president, Consolidation Coal Co. (Ky.), Jenkins, Ky. Explaining that augering on his company's property is done

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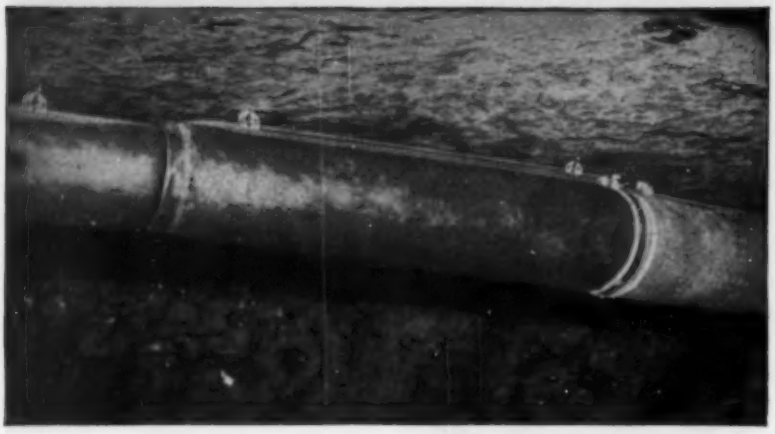

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on a small scale because of limited highwall, a narrow pit and a parting that limits auger diameter, Mr. Zegeer described operations with a Cardox-Hardsocg unit with augers ranging from 24 to 36 in in diameter. The machine needs only 25 ft of width in the pit.

Two heads are used with each size of auger to save extra handling and conserve space in the pit. One head and the auger sections are left in a complete hole, the alternate head is used to start the new hole, and auger sections are withdrawn from the completed hole as needed in the new hole, Mr. Zegeer explained. To avoid the danger of running holes together and damaging auger sections, holes are spaced a safe distance apart.

With 6-ft auger sections, it takes 2 to 3 min to drill a section length and 45 sec to retract and add a new section. Holes may be drilled as deep as 123 ft, depending upon the proximity of old underground workings. Productivity with a 36-in auger averages 30 raw tons of coal per man-shift for a 3-man crew. Screen analysis of coal produced by a 24-in auger cutting at full speed was as follows, Mr. Zegeer reported: 24% 3 x 8-in; 20% 3 x 1-in; 4% 1 x ¾-in; 26% ¾ x $\frac{3}{16}$-in; 24% $\frac{3}{16}$ x 0-in.

"A great deal of the ground in our stripping was at incandescent temperatures—1,500 F."

Advances in stripping techniques made it possible to strip-mine anthracite in an area where an underground fire had raged since 1932, said J. W. Davies, blasting engineer, Shen-Penn Production Co., Shenandoah, Pa. By the time stripping began in 1946, the fire had spread to the surface as well as horizontally and the surface was so hot that sticks placed in cracks in the ground would burst into flame. As stripping advanced toward the burning area and temperatures rose, peculiar conditions requiring special attention appeared. With the ground at incandescent temperature, trailing cables had to be suspended, anthracite silt or clay had to be spread in a layer over the bench behind the shovels to protect tires and workmen, truck tires frequently broke into flame and dust obscured vision. To protect shovel operators, shovels always dug with the wind blowing away from the operator and cabs were equipped with blowers to force clear air through the shovel.

No incandescence ever appeared in solid coal, Mr. Davies pointed out. The fire seems to have been propagated through the loose coal in the gob from old underground workings and through the rock strata. Dry, hot coal as mined was sent to a stockpile, where it was cooled by a continuous water spray before being shipped to the plant for rough cleaning. Water used in drilling was about double the quantity required for a normal cool hole. Drilling often was marked by violent eruptions of hot water and steam from the mouth of the hole. Drill platforms were equipped with blowers to divert hot air and gases from drill crews, who were equipped with safety goggles and carbon-monoxide detectors.

A nitro-carbonitrate explosive was especially developed and found suitable for blasting in the burning area, Mr. Davies said. Naturally, as temperature of the holes increased, maximum time for loading and firing decreased; in a hole 750-800 F, for instance, only 3 min. Holes above 800 F were water-cooled before loading. In addition to the special explosive, a special RDX plastic Primacord was developed for the operation. Detonation produced a great cloud of dust and vapor, limiting blasting to times when the wind was blowing away from the nearby town of Shenandoah. To protect the town against flying materials, the company used 9-ft-square blasting mats woven of ⅛- to ¾-in wire rope and weighing about 1,000 lb.

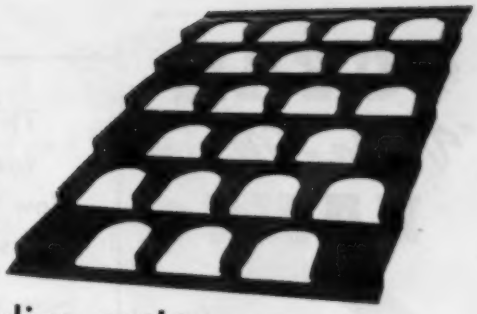
"The aim—high productivity: the method—adapt the machine to the man."

Capital equipment in stripping is destined to be bigger and more complex, with more power at the call of the machine operator and, consequently, more responsibility on him, said T. M. Ware, vice president, Engineering Div., International Minerals & Chemical Corp., Chicago. Mr. Ware was lead-off speaker at the Tuesday afternoon session on stripping, with E. R. Phelps, vice president, Pittsburg & Midway Coal Mining Co., Pittsburg, Kans., presiding.

Recounting his company's experience with adapting a big stripping machine to the needs of the operator, Mr. Ware said that such adaptation followed the recommendations of psychologists, biomechanic experts, doctors, engineers, designers and others. Improvements were aimed primarily at the dragline operators who, because they handled all mined material, were the key men. Changes made in the dragline resulted in improvements in visibility, cab housing and controls. The operator was provided with a comfortable seat; a cab equipped with non-glare glass; legible instruments; a communications system contacting other parts of the dragline, the pit and field units; and controls designed to simulate the desired action of the machine. Pedal controls were eliminated. Though the dragline operators had been with the company for 20 to 30 yr, they accepted the newly designed cab and the new work methods with good spirit and their productivity has increased accordingly, Mr. Ware said.

Deep-mining machinery also can be adapted to the needs of machine operators, said J. W. Woomer, J. W. Woomer & Associates, Wheeling, W. Va., who discussed Mr. Ware's paper. Upon mine owners and managers rests the great responsibility of spending money to increase mining efficiency in the years ahead, he said, pointing out that deep-mining companies can spend about 6% of their gross income for capital improvements. As an example of how machines today can be adapted to men, Mr. Woomer reported that some continuous mining machines have been equipped with comfortable chairs, with corresponding improvements in efficiency.

How to see



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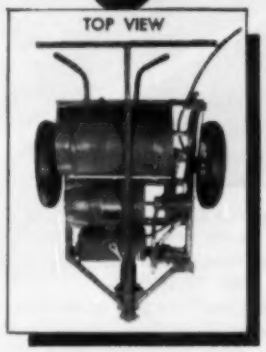

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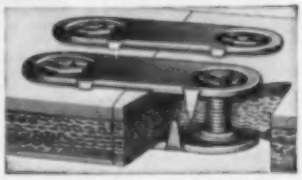

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"Personal factors must be reckoned with in handling complaints about blasting vibrations."

Complaints about vibrations from blasting make it important to understand human reactions having their roots in psychology and medicine, said J. E. Jenkins, Vibration Measurement Engineers, Chicago. Much depends upon the personal factor—whether the person who claims to feel the vibration is standing or sitting, the direction from which the vibration comes, the suddenness of the blast and whether the person expects the blast, he pointed out. Helpful data on blasting vibrations now are available for stripping operators faced with lawsuits, he reported.

At certain points in a curve representing degree of vibration and size of charge, there is a dip in displacement effect where one would expect the curve to keep rising, Mr. Jenkins revealed. This dip sometimes is as much as 36% below normal expectation. Though variables must be taken into account, the dip point can be found for each stripping operation by assembling adequate seismographic data and charting them. Finding the dip point and adapting blasting to it results in more useful work per pound of explosive and also reduces vibration, Mr. Jenkins said.

Commenting on Mr. Jenkins' paper, J. L. Romig, Technical Div., Atlas Powder Co., reported that complaints about vibration often are at variance with seismographic records, indicating a psychological origin for complaints. He suggested, therefore, a drilling and blasting procedure that would eliminate even imaginary complaints. Such a procedure would include: (1) a sound drilling pattern; (2) sufficient stemming, preferably a dry, coarse sand; (3) individual attention to charging each hole; (4) starting the detonation at the greatest confinement of explosive, usually at the bottom of the hole; (5) controlling the direction of the blast by proper use of delays; (6) using the type of explosive that works best on the material being shot; and (7) blasting when housewives are busiest and least likely to notice vibrations, usually in the morning.

"Without good roads, truck maintenance will increase and production decrease."

Careful planning, sound construction and adequate maintenance are necessary if strip-mine haulage roads are to carry the heavy loads required of them, said R. H. Uhl, mining engineer, W. G. Duncan Coal Co., Greenville, Ky. The task, he pointed out, is to get the shortest route with the least grade against the load and, if possible, with the grade in favor of the load. It is good practice to build the grade to fit the gear of the coal hauler, with maximum grade running from 2½ to 7%. Citing a hypothetical case, Mr. Uhl assumed a straight grade of plus 2% from pit to dump and a distance of 5,000 ft, plus a hauler that will travel up a 1% grade in fourth gear

at 20 mph and up a 4% grade in third gear at 11 mph. If grades of 1 and 4% are used in combination so that they will average 2% over the total distance, travel time can be cut from 5.2 to 3.6 min, a 30% time saving over the total distance.

In building roads, usually from 1 to 3 ft of an impervious layer is needed to keep water out of the sub-base, Mr. Uhl explained. The material for this often is shale from the stripped area or refuse from the plant, though fireclay and limestone sometimes are used. This material should be put down and graded well ahead of the time the road is to be put to use, so that it will be well settled and compacted. Surfacing material at his company's mines is mostly crushed limestone, with a 3- to 6-in base of coarse rock put down in two layers and compacted, followed by a 2- to 3-in layer of 1 x ¾- or 1 x 0-in rock, Mr. Uhl said. He reported also an experiment now being conducted with ¼ x 0-in limestone on top of a sandstone spoil bank, which has held up under light traffic for 2 yr.

Road maintenance is the most important phase of haulage, Mr. Uhl contended. Surface must be kept smooth for high-speed haulage, ditches must be kept open to avoid soft spots and the surface must be repaired regularly to insure all-weather service. At present, the company is experimenting with ¼ x 0-in crushed rock for resurfacing. This makes a smooth surface, is easy to grade, is less dusty than larger rock, mixes well with the mud and fireclay carried out of the pit and fills the voids in the larger rock, he said.

Markets and Preparation

"Major users of coal in the near future will be the electric-utility and iron and steel industries."

In the future, preparation plants supplying coal to electric utilities will tend to have a more simplified and less costly flow sheet, with possibly a tendency towards more air-cleaning of fines and some preliminary heat drying, predicted J. B. Morrow, Alford, Morrow & Associates, Pittsburgh. Mr. Morrow was the first speaker at the Tuesday morning session on coal preparation. G. R. Watkins, general manager, United States Fuel Co., Salt Lake City, presided at the session.

In full-seam mining with large percentages of reject, a balance is needed between the reduced cost of mining and the increased cost of preparation in terms of final consumer value, Mr. Morrow contended. He wondered, therefore, if some coals for some customers are not being over-prepared. In preparing coal for blast-furnace coke, for instance, washing to too low an ash content, with resultant decreased recovery, can be as costly as not washing at all, and the highest economic value may be reached by cleaning at some intermediate point. Recently, the American Iron & Steel Institute and the American Coke & Coal Chemicals Institute have completed a

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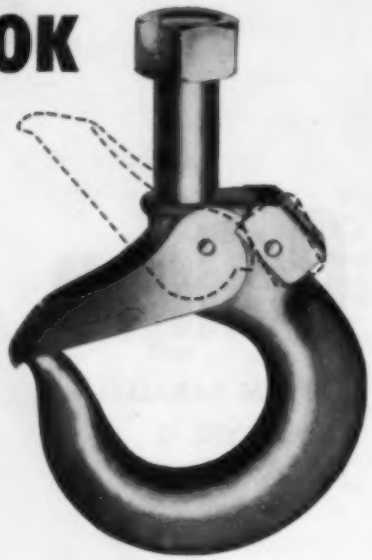

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$150,000 study to determine basic factors affecting coke quality and its performance in the blast furnace. There is need today for a similar study, conducted jointly by the coal and electric-power industries, on the economic factors in utility fuel, Mr. Morrow said.

Commenting on Mr. Morrow's paper, Julian E. Tobey, president, Appalachian Coals, Inc., Cincinnati, said that the outlook for higher quality iron ore charged to the blast furnace indicates less slag volume in the future. That means, in turn, a decreased capacity to carry away sulphur. Also, the expected lower consumption of coke per ton of pig will reduce still further the slag volume and therefore the capacity to carry away sulphur. All this adds up to the fact that a constantly higher degree of preparation will be needed for metallurgical coals, Mr. Tobey said. As for steam coals, degree of preparation will depend upon industrial demand and competition. There is a trend toward better preparation of minus ⅜-in steam coals because the higher steam temperatures now being used in utility boilers demand higher furnace temperatures. Cleaner coals therefore are needed to minimize slag accumulation on boilers and superheaters, reduce corrosion of boiler metals and cut down on flyash and sulphur fumes.

Urging a new look at buying and selling coal in the utility market and citing the growth of the utility market, Mr. Tobey declared that buying and selling methods still are in the horse-and-buggy stage. As it becomes necessary to provide more run-of-mine coal to utilities in the future, more mines doubtless will sell their entire output on long-term contracts with utilities. Preparation plants for these mines will be simpler and cheaper than now. Meanwhile, utility customers, gradually abandoning the practice of buying on Btu's alone, will examine more closely the plus values and nuisance values of the coals they buy, Mr. Tobey predicted.

"We aimed for 3/16x0-in coal with not over 12½% total moisture and 12% ash."

Sludge from jigging operations, though quite high in ash, can be sold after cleaning, said I. V. Curtis, chief electrician, Midwest Radiant Corp., Millstadt, Ill., who reported on his company's experience with sludge recovery. In Mr. Curtis' absence, his paper was read by G. W. Sall, assistant editor, *Mining Congress Journal*. The sludge-cleaning plant, which operates independently of the main preparation plant, is quite simple, comprising four Deister Super-Duty tables, a Link-Belt Multi-Louvre drier, a Furnace Economy heater, a Link-Belt BH stoker, a Link-Belt 6 x 12 vibrating screen, a 4 x 8 Simplicity screen and three Wilfley pumps. Sludge is pumped to the 4 x 8 vibrator, beneath which is a valve that distributes the sludge to the four tables.

Clean coal, gathered in a sump beneath the tables, is pumped to the 6 x 12 vibrator, where it is dewatered to about 32% total moisture (inherent moisture is

10.5%). This coal is stored in two 135-ton bins, where drainage cuts moisture to 22%. The heater, burning some 1,250 lb of coal per hour, provides hot air to the Multi-Louvre drier, which brings moisture down to 12½%. The final product can be stored in a bin for truck loading or blended with 1¼ x 0- or ¾ x 0-in from the main plant.

Operating and maintenance costs for the sludge plant are low, Mr. Curtis reported. For example, actual repair parts for the tables cost somewhat less than $20 per year per table. One man operates the plant from a central control panel. Production runs to over 100 tons of fine coal per 6¾-hr shift, plus some 50 tons of tramp coal that otherwise would be thrown out.

"Heavy media has made possible high-capacity, low-cost, full-seam mechanical mining, plus high quality."

Modernization of mines and plants of their company began in 1947, said A. E. Sadler, assistant chief engineer, and J. W. Forman, preparation engineer, Pocahontas Fuel Co., in a jointly prepared paper presented by Mr. Forman. Modernization involved the following: (1) building a coarse-coal washery at the Amonate plant; (2) reopening and mechanization of the Ittman mine, together with design and construction of its cleaning plant; (3) mechanization of Pocahontas, Amonate and Bishop mines; and (4) construction of fine-coal cleaning plants at Amonate and Bishop. The paper by Messrs. Sadler and Forman dealt with coarse-coal plants at Amonate and Ittman. Heavy media was adopted for these plants because it promised to perform to required specifications. These specifications were:

1. Ability to effect efficient separation with a high percentage of near-gravity material in the feed.
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With three concentrators at Ittman and two at Amonate, clean coal, middlings and refuse are produced with minimum misplacement. At Ittman, magnetite consumption averaged 0.68 lb per ton of feed; at Amonate, 0.55 lb. The efficiency and versatility of heavy-media washing as demonstrated at these two plants contributes to the overall success of the Pocahontas operation, the authors declared.

First application of heavy media, using a suspension of magnetite in water, for cleaning Sewell-seam coal was described by D. C. Snyder, vice president, Mount Hope Coal Co., Mount Hope, W. Va. With full-seam mining, specific gravity of the raw feed to the plant ranges from 1.32 to over 1.90, while clean coal runs at 1.25, making close gravity separation

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The dependability and safety of a screw-type jack with the fast operation of a crank! That's the combination offered in this new Simplex No. 642 Timber Jack. In mines, where fast timboring is often vital, this jack more than pays its way in doing the work of several men in raising and locating roof timber. With the head on a swivel, it can work right against a wall or rib. Capacity is 6 tons and there are five models with minimum heights as low as 3-ft., 6-in. and with maximum heights of 9-ft., 6-in.

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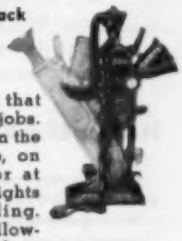

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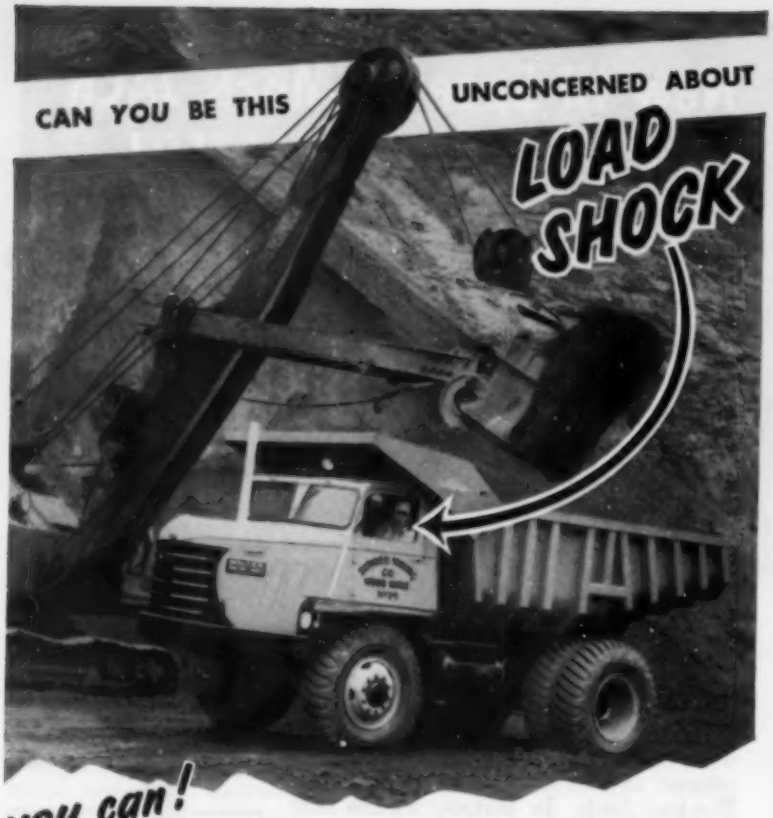

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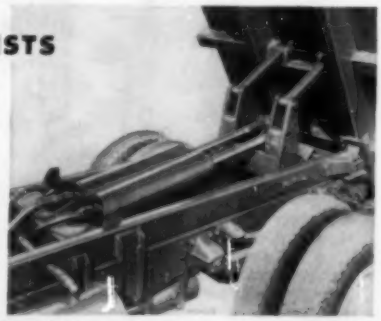

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necessary. The 7 x ¼-in raw coal is preconditioned for the washer by means of a pressure water spray, which removes dust, and is fed to the heavy-media vessel. Adjustment of the plant is so sensitive that specific gravity can be changed from 1.35 to 1.36, for instance, almost at the touch of a button. Less than 1 lb of magnetite is lost per ton of clean coal. Overall, with specific gravity set at 1.32, original ash content of run-of-mine, ranging from 3 to 50%, is reduced to an average below 2½%, Mr. Snyder reported.

"Feldspar jigging as a means of cleaning fine coal is not new."

Citing the European practice of cleaning fine coal in jigs equipped with artificial beds of feldspar, H. F. Yancey, chief, Fuels Technology Div., Region II, USBM, Seattle, Wash., suggested that feldspar jigs might serve a useful purpose in this country as well. Dr. Yancey presented a paper prepared jointly with M. R. Gree and U. K. Custred, USBM. Investigations were conducted at the Seattle station to find out: (1) the utility of the feldspar jig; (2) its cleaning ability with respect to specific size fractions of the feed; and (3) its performance compared to that of the wet table.

Studies thus far have been made on only one coal—¾ x 0 from the No. 3 bed, Pierce County, Wash.—on a laboratory scale. Feeding 625 lb per hour of coal with 8.75 gpm of water, ash content was reduced from 17.7% in the raw coal to 11.3% in the washed coal. The yield was 89%; recovery efficiency, 98.9% for all sizes. However, marked failure occurred on fine coal below 48-mesh, Dr. Yancey said. Even so, better results might be obtained with full-scale equipment, he suggested.

"We must take better care of the wastes of our mining operations."

Too often, cleaning-plant reject material gets no attention from management until it begins to crowd the mine yards and roads, said W. A. Weimer, chief engineer, Northern Illinois Coal Corp., Wilmington, Ill. Mr. Weimer was the first speaker at the Wednesday morning session on preparation, with R. E. Kirk, manager of raw materials, Tennessee Coal & Iron Div., U. S. Steel Corp., Fairfield, Ala., presiding.

Seeking efficiency and economy in refuse disposal, Northern Illinois Coal Corp. for some years has been pumping part or all of the plant refuse to disposal, Mr. Weimer said. With trucks handling coarse reject and pumps handling refuse below 10 mesh, total weighted costs of refuse disposal at two mines recently ran about 10c per ton. At another mine, where refuse up to 4-in in size was pumped to disposal over a number of years, costs ran 2.6c per ton for disposal of 203,000 tons in a year's time. In a newly proposed system, reject up to 4 in. with specific gravity averaging 2.4 and with 20% of the mixture being dry solids by weight, will be pumped at the rate of 100 tph at a

velocity of 12 fps through 500 ft of 8-in pipe. Capital cost of the system will be $13,860. Total pumping costs, including maintenance, power and replacement, are expected to be about 2.6c per ton. The system will be totally automatic, requiring no labor charges, Mr. Weimer pointed out.

Discussion of Mr. Weimer's paper brought out that Armco steel pipe probably will convey up to 300,000 tons of refuse before replacement, compared with the 100,000 tons cited for other pipe by Mr. Weimer. Pipe life also may be extended by crushing reject to smaller sizes, since smaller sizes tend to lubricate the system and permit a higher percentage of solids to be pumped.

Constant vigilance is necessary over maintenance and capital costs of refuse-disposal systems as well as over capital costs, said T. W. Guy, consulting engineer, Charleston, W. Va. Citing case histories at five mines in his experience, Mr. Guy urged consideration of the following: (1) a fire in a refuse pile always requires either increased cost, or a new disposal area, or both; (2) moderate expenditure for systematic piling and compacting of refuse nearly always prevents firing; and (3) systematic piling of refuse makes it possible to recover merchantable coal from the refuse when demand increases and prices rise.

"Too much coal is lost in washery waste as misplaced material."

Coal losses in washery plants have been kept at a minimum by a systematic program at his company's plants, said R. A. Mullins, chief chemist, Ayrshire Collieries Corp., Indianapolis, Ind. This program comprises three main points: (1) plans for new plants insure adequate capacity; (2) continuous maintenance and replacement of worn equipment makes for best possible washing efficiency; and (3) laboratory control provides information necessary for points 1 and 2 above as well as data needed for continuous efficient operating conditions.

In selecting equipment, first problem naturally is to determine the degree of difficulty of washing the raw coal that will be produced, Mr. Mullins explained. When this is done, the type of equipment can be selected. Large capacity is desirable because as tonnage increases, a wider range of units can be used efficiently in the plant. For instance, at the Harmattan plant, capacity is large enough to justify use of a Rheolaveur unit, which recovers amout 12 tph of coal down to 60-mesh, which otherwise would be lost as plant waste. Helps in cutting cost and maintaining plant efficiency are: (1) painstaking maintenance; (2) inspection and maintenance records; (3) preventive maintenance on a schedule; (4) replacement of parts whenever the cost of coal losses begins to equal the cost of new parts; and (5) frequent and careful sampling and analysis of samples, for both clean coal and refuse.

Concluding, Mr. Mullins said that reduction of washery wastes is inseparably related to the planning, operation and maintenance of the plant and that a

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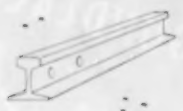

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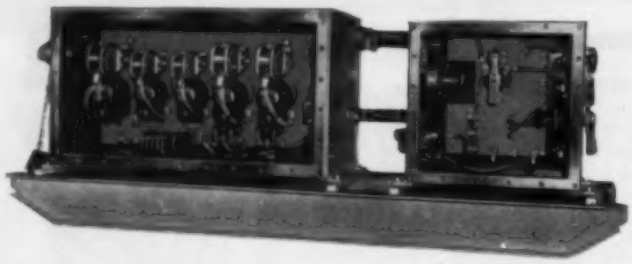

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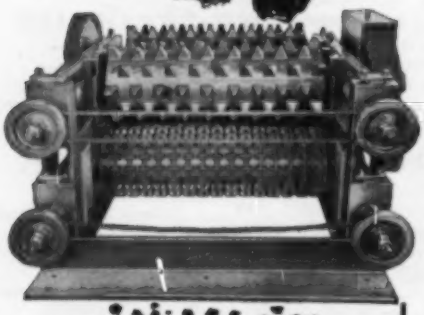

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change of but a small percentage in the quantity of coal recovered from refuse can pay for a complete system of sampling and laboratory analysis.

The quantity of fines recovered in relation to expenditure necessary to recover them is an economic problem, said R. A. Lewis, chief engineer, The Carbon Fuel Co., Carbon, W. Va., who discussed Mr. Mullins' paper. This, he pointed out, is a problem for each individual mine. For example, he discussed the cleaning of minus 10-mesh fines, which are the most difficult and expensive products to clean. In addition to the added cost of thickeners and filters, recovery of these fines may lower the Btu value of the coal, may mean higher freight charges because of added water and may involve the cost of thermal driers to reduce moisture. Contending that uniformity of product is more important than low ash, sulphur and moisture and that economics is the over-riding consideration in cleaning fines, Mr. Lewis concluded that "all that glitters is not gold."

"Acid mine water drainage is one of the most difficult problems we have to contend with."

The tendency of the coal industry to assume that because no solution to the acid mine water problem is now available the situation can be ignored is dangerous and must be resisted, warned H. F. Hebley, research consultant, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa. Research on the problem is continuing, with studies having been released recently by the Mellon Institute and West Virginia University.

Though the Mellon report offers no sure cure, it does explode a number of popular theories held by groups that have given little or no study to the problem. Today, however, the coal industry is not contributing to research on stream pollution and a project undertaken by Johns Hopkins University has been dropped abruptly because of lack of funds. With the threat of legislation hanging over the industry, coal must seize the initiative and obtain correct, authentic data that will form the basis of equitable regulation, Dr. Hebley contended. Today, he reported, it is impossible to obtain from many operators any accurate information on the percentages and quantities of solids being discharged into streams from their operations. Dodging the facts will not protect the industry from unfavorable legislation, he warned.

Commenting on Dr. Hebley's paper, L. E. Sawyer, Indiana Coal Producers' Association, reported that the acid mine water problem is pretty well in hand in Indiana and that operators and legislators are working amicably together on the problem. Gilbert Hamlin, Ohio Valley Conservation Commission, commented favorably on the cooperation now being obtained from industry groups, including coal, and said that a rational program for stream purification now is taking shape, involving a study of the quality of water needed in the Ohio Valley and the steps needed to make that water available.

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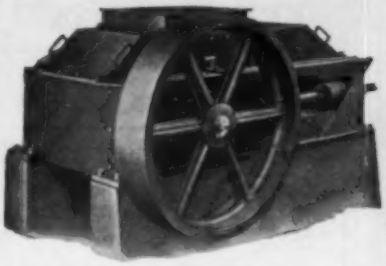

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1—18" x 18" Jeffrey single roll
1—24" x 24" Jeffrey single roll
1—24" x 36" McNally-Pittsburg double roll
1—36" x 42" double roll
1—30" x 16" Williams pulverizer
1—36" x 48" Jeffrey hammermill

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1—5 HP Brownie room hoist
1—5 HP Sullivan RH room hoist
1—7½ HP Sullivan double drum slusher hoist
2—10 HP Sullivan 3 drum slusher hoist
1—Ingersoll-Rand mod. 6HC air tugger hoist
2—6½ HP Sullivan tuggers, 250 v. DC
7—6¼ HP Sullivan double drum, 250 v. DC
1—10 HP Sullivan double drum driven by Continental gasoline engine

BOX CAR LOADERS

3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12'x15"
1—Card portable loader, 11'x19"

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1—Jeffrey, 75' centers, 9" flights
1—Jeffrey, 67' centers, 30" flights
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1—Jeffrey, 72' centers, 30" flights
1—Jeffrey, 88' centers, 36" flights
1—Jeffrey drag, 28' centers, 9" drags
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ROTARY DUMPER

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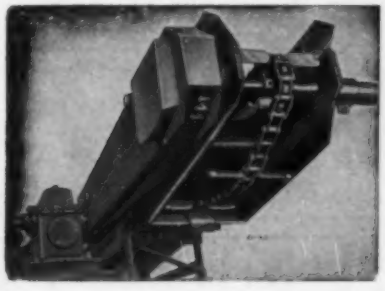

ELECTRIC HOISTS

1—11 HP Vulcan #0 single drum
1—20 HP Vulcan single drum
1—22 HP Vulcan double drum
1—25 HP Vulcan single drum
1—30 HP Vulcan single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan single drum
1—145 HP Vulcan single drum
2—150 HP Vulcan single drum
1—375 HP Box Single Drum Hoist, 800 FPM with 375 HP GE Slipring Motor, 575 RPM, complete with controller, grids and magnetic contact panel.
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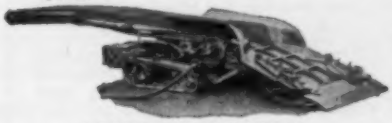

LOADERS & CONVEYORS

1—8BU Joy loader
1—61EW Jeffrey elevating chain conveyors
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shaker conveyors
6—G-15 Goodman shaker conveyors
8—Vulcan shaker conveyors
2—Joy ladel UN-17 shaker conveyors
10—Goodman HA duckbills

MINING MACHINES

2—7B Sullivan super short wall coal cutters
18—CE7 Sullivan coal cutters
1—CR3 Sullivan coal cutter
1—Jeffrey 28A coal cutter
6—Goodman 112-A coal cutter
1—Sullivan CH-11 ironclad shearing machine
1—Jeffrey 29-C Arcwall coal cutter

SCALES

3—100 ton Fairbanks railroad scales
1—100 ton Howe railroad scale
1—125 ton Howe railroad scale
1—5000# Fairbanks Tipple scale with weighing basket
1—5000# Howe Tipple scale

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5—3'x5' Tyler "Hummer" electric vibrating screen
1—42"x72" Jeffrey-Traylor electric vibrating screen
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125—60 cu. ft. Card steel coal mine cars 36" ga.
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2—50 ton capacity steel bins

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2—108" Card bicycle sheave wheels
2—96" wood filled sheaves
2—84" Card bicycle sheave wheels
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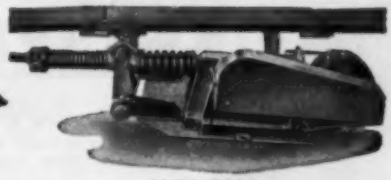
2—8-H Jeffrey 42" Aerodyne fans
1—7' Jeffrey Aerovane 2 stage fan
2—Jeffrey #61 exhaust blowers
7—Jeffrey Aerodyne midget blowers
1—2600 cfm Brown-Fayro exhaust blower
2—3000 cfm Claridge exhaust blowers

PICKING TABLES

1—Link-Belt, 20' centers, 18" pans
1—Card, 41'6" centers, 30" pans
1—Card, 51' centers, 48" pans
1—73' centers, 30" pans
1—64' centers, 48" pans



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1—Link-Belt, 42' centers, 6"x4" buckets, single chain, complete with steel housing
1—Link-Belt, 36' centers, 18"x8" buckets, double chain
1—12' centers, 14"x7" buckets on belt
1—35' centers, 10"x5" buckets on belt

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1—Jeffrey 24"x13'
1—Barber-Greene, 24"x66'
1—Barber-Greene, 24"x135'
1—Barber-Grene, 30"x173'

LOCOMOTIVES

1—2 ton Whitcomb, battery, 24" ga.
2—2½-3½ ton Mancha battery, 24" ga.
1—4 ton Westinghouse-Baldwin battery, 24" ga.
1—4 ton Ironton, battery, 36" ga.
2—7 ton G.E. permissible battery, 36" ga.
1—7 ton Atlas, battery, 36" ga.
3—8 ton Ironton battery, 36" ga.
2—8 ton G.E. battery, 36" ga.
2—8 ton Goodman battery, 36" ga.
4—10 ton Atlas battery, 36" ga.
1—3 ton Whitcomb gas engine driven, 24" ga.
1—2½ ton Jeffrey trolley, 36" ga.
1—4½ ton Goodman trolley, 36" ga.
1—5 ton Jeffrey trolley, 36" ga.
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1—1100 HP Nordberg. Drum will spool 10,000' of 1⅜" rope.

1—800 HP Nordberg. Drum will spool 8000' of 1⅜" rope.

2—400 HP Vulcan. Drum will spool 6000' of 1¼" rope.

Several other 200 HP and 300 HP Slope Hoists, all equipped with 2300 volt motors, post and hydraulic brakes, and all necessary appurtenances. All late type, offered at very attractive prices.

Have several late type 14-BU, 8-BU, and 11-BU 250 V DC Joy Loading Machines; several 5-SC, 6-SC and 42-E Joy Shuttle Cars with Magnetax controls and airplane brakes.

Bargain to offer in 200 KW and 300 KW Rotary Converters and Motor Generator Sets.

2—Link-Belt 5-cell Wash Boxes, capacity 150 TPH and 350 TPH.

300—Sanford-Day, 42" gauge, all steel Rotary Dump Mine Cars, 14" Timken bearing wheels, height from rail 40", outside length 12', width outside bed 6', length overall including semi-automatic couplings 14', level full capacity 4 tons. Cost new in 1948—$900.00 each. Bargain for only $225.00 each. In practically new condition. Complete with Roberts & Schaefer Rotary Mine Car Dump, push button control.

138—Sanford-Day 3-door Drop Bottom Mine Cars, 42" gauge, width 6', length 12', ht. from top of rail to top of car—32", 16" ballbearing cast steel wheels, 3¼" axle, wheel base 46", capacity 172.8 cu. ft., constructed of ¼" steel. Cost approximately $1000.00 each in 1951, and used only a short time. In practically new condition. Can offer for only $225.00 each.

All types of cat and rubber tire mounted Cutting Machines, rebuilt Locomotives from 6-ton to 20-ton for any track gauge.

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$20,000.00

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NEW and RELAYING

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- 2—Baldwin-Westinghouse 8-ton mine locomotives with reels, 500-V, 44" gauge at present but can be changed. Explosion proof, late type ball bearing motors.
- 1—Baldwin-Westinghouse 8-ton mine locomotive with reel, 250-V, 44" gauge at present but can be changed. Explosion proof, late type ball bearing motors.
- 4—5SC Joy shuttle buggies.
- 2—32-D Joy shuttle buggies.

Call us for anything in coal mine equipment.

The Industrial Machine & Electric Co.
T. E. DAVIES, Owner
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LOCOMOTIVES: 1 Jeffrey 20-ton, Serial #7802; 1 Jeffrey 15-ton, Serial #1909; 1 Jeffrey 13-ton, Serial #4456; 1 Jeffrey 10-ton, Serial #7404; 2 G.E. 8-ton, Serial #3659 and 4947; 2 Jeffrey 4-ton, Serial #5231 and 6129.
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CUTTING MACHINES: 2 Jeffrey 29B Arcwall.
DRILLS: 5 Jeffrey A-6 Post type.
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MISCELLANEOUS: Large supply of new spare parts for above machines at 50% discount, separately or with machines.
All equipment 250 Volt D.C. 42" track gauge.

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1	Goodman drag conveyor
1	5-BU Joy loader
45	Goodman mining machines
33	mine locomotives, 4 to 15-ton
51	hoists, with motors, transformers, etc.
70	fans with motors
12	blowers and fume collectors
2	air compressors
15	motor generator sets, motors, panels, switches
57	mine pumps and motors
7	high pressure and portable rock dust distributors
70	motors, ¾ HP to 300 HP
	Panels, controls, switches, circuit breakers
	Welders, bonders and acetylene generators
60	mine telephones and trolley phones
883	pit cars and steel ore cars
768	trip lamps, cap lamps and safety flame lamps
25	transformers, 1½ to 25 KVA
1	sand dryer

For further details, write directly to:

Mr. I. N. Bayless, *President*
The Union Pacific Coal Company
Union Pacific Building
Omaha 2, Nebraska

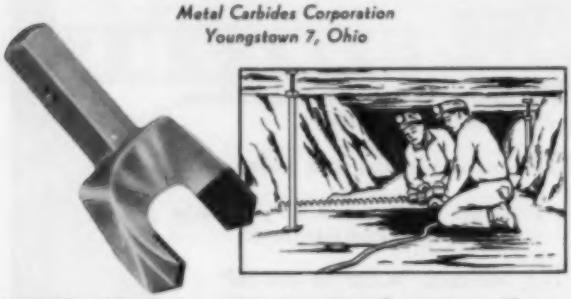
or

Mr. I. M. Charles, *Chief Engineer*
The Union Pacific
Coal Co.
Rock Springs, Wyoming

SUPERSET CORE BITS

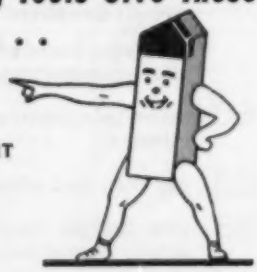
● Mining contractors, ore prospectors, coal operators and construction firms are realizing tremendous savings by taking advantage of our **exclusive fabrication service!** Contractors send us the necessary diamond stones from their own stocks—we hand set them in a super-hard tungsten carbide crown and braze to the threaded steel blank. Hand-set bits assure the proper positioning of each diamond stone to achieve maximum cutting efficiency. The carbide matrix holds the diamond stones until entirely used up. These advantages mean lower drilling costs to you. We can also supply complete core bits or salvage the stones from used bits at nominal cost. Supplied in standard sizes EX, EXE, AX, BX, NX, etc.

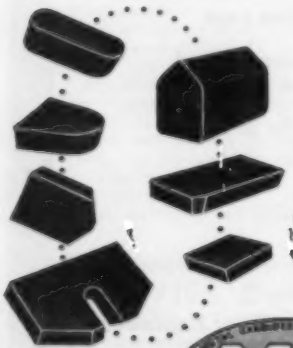
Metal Carbides Corporation
Youngstown 7, Ohio



Talide Tips for Mining Tools Give These 3 BIG ADVANTAGES . . .

1. EXTRA STRONG
2. SUPER HARD
3. SHOCK RESISTANT





● A complete line of low-cost, high-quality Talide Tips is offered fabricators and users for tipping machine bits, rock bits, drill bits, roof bits and open-pit bits. All Talide Tips have a special surface finish that facilitates brazing. Non-standard shapes and sizes quoted on request.

TALIDE
YOUNGSTOWN 7, OHIO
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OVER 35 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

Parmanco

H-81-53

HORIZONTAL DRILL

Easily cuts drilling time IN HALF

Completely Re-designed

- *with hydraulic feed*
- *horse power increased to 81 with "254" cubic inch engine*

Included in the new design is a sturdier frame, with the elimination of racks, pinions, and all mechanical power feed gearing. The four individually adjustable jacks make possible faster set-up and smoother drilling.

The H-81-53 drill is designed for drilling 5-6-8 inch holes to 100 feet or more. The greatly increased 81 h.p. engine in combination with the hydraulic feed makes possible the reduction of footage time by at least one half. All drive gears are totally enclosed. Power feed features direct hydraulic feed eliminating reduction gearing in hydraulic feed system.

This new drill—the very latest in design—is equipped with self-starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes, and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling. Send for complete details.

PARIS MANUFACTURING CO.

PARIS, ILL.

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AUTOMATIC MINE DOOR
The American Mine Door long ago eliminated trapper boys . . . saved countless lives . . . maintains trip speeds that increase output by thousands of tons . . . saves cash in electrical cost stopping and starting trips . . . snaps open snaps shut.
TYPE "Z" MINE DOOR
LORAIN COAL AND DOCK CO., BLAINE, OHIO

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950 Oak Street
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McCarthy

COST CUTTING DRILLS
BLAST HOLE DRILLS

TRUCK-MOUNTED HORIZONTAL

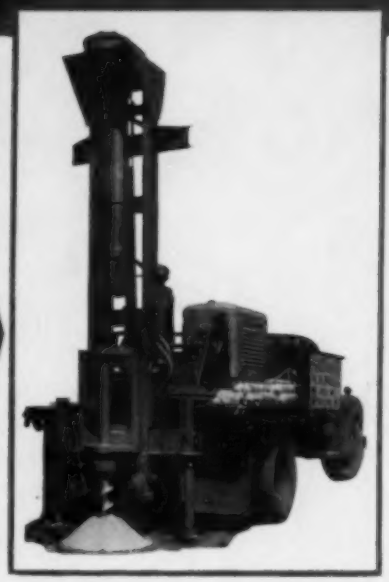
● Satisfied customer reports, "I drill so many more feet per minute with my McCarthy than I did with my old jet rig that I quickly recovered the low initial purchase cost."

VERTICAL DRILL

● "Amazing savings," says Owner-Contractor J. F. Nichols. He drilled six-foot-deep blast holes in 40 seconds each as against 30 minutes each with wagon drills, claims savings of $7500 per month. "Greatest purchase I ever made," says Nichols.

SELF-PROPELLED HORIZONTAL

● A New Castle, Pa., operator reports boring "840," various depth holes through shale and sandstone, in one working day." Bores 6" and 8" diameter holes at rate of 6' per minute maximum.



Heavy Rugged Powerful

COAL RECOVERY DRILL

● Robert B. Cleghorn, Jr., Hodgeville, West Virginia, reports his hydraulical, self-moving 42" McCarthy Coal Recovery Drill mines "up to 500 tons of clean, low-cost quality coal per day." Cleghorn has a three-man crew—operates in pits as narrow as 34 feet. Operator has total vision, including the highwall. Model 12 handles 24' augers from 16" to 48" in diameter.

● Other McCarthy Coal Recovery Drills handle augers 4', 6' and 12' in length.

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THE SALEM TOOL CO.

763 S. ELLSWORTH AVENUE, SALEM, OHIO

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POWERHOUSE

AT STEAMBOAT SPRINGS

High up in the mountains of Colorado, 12 miles from Steamboat Springs, this Caterpillar D8 Tractor is removing overburden at a coal-stripping operation of Osage Coal Co.

Even in this "dead" material, the scientifically curved moldboard of the No. 8A Bulldozer creates a rolling action for heaping, fast-moving, *high-profit* blade loads. The D8 and matching 'dozer have the strength and stamina to work in frozen earth, and to take the equipment-busting knocks of work around rock. Yet this big yellow bruiser treads lightly on soft ground. It can work through quick thaws and spring mud because its broad tracks keep gripping under all load conditions. The Cat* Diesel Engine in the D8 delivers its full horsepower *at the bulldozer blade*. It will not smother under heavy loads, because it develops maximum "push" when lugging down, even in this thin mountain air.

The experience of Osage Coal Co. goes back to an old gas-powered Caterpillar Auto Patrol, which is still in service. In addition, they own a D7 and a D6 Tractor. "Our Cat machines are doing good work for us," states G. E. Ralston, superintendent.

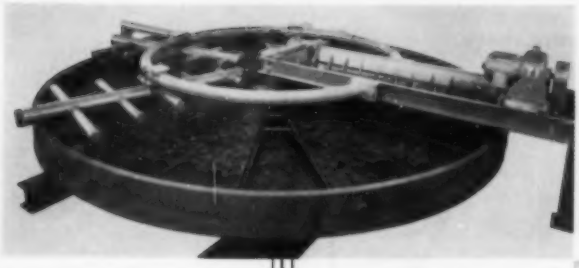
You, too, can expect years of good work from Caterpillar equipment. Ask your Caterpillar Dealer to demonstrate the rugged tractor-'dozer team that's built to do most work for *you* at lowest cost. And count on your dealer for fast, skilled service and genuine Caterpillar parts.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

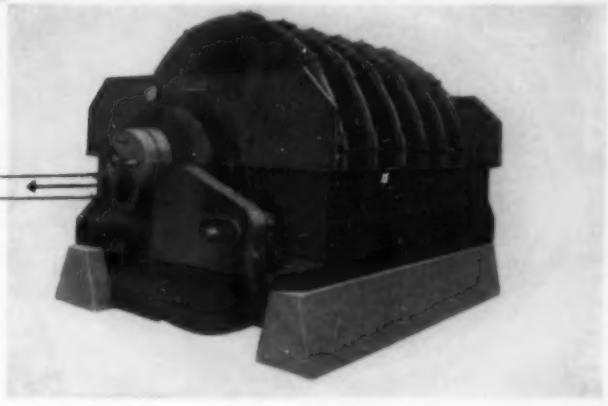
CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

Coal Dewaterers...



that keep fines out of the filtrate



Do you want to re-use the wash water coming from your coal preparation plant? Then, fines 'build up' becomes a problem, including the added maintenance burden on the recirculating pumps resulting from excessive solids.

The answer is simple. Install a dewaterer that retains the fines . . . that delivers a re-usable filtrate carrying less than 1% solids, a manageable quantity . . . install either the Oliver Horizontal Filter or the American Disc Type Filter or both as a team with a classifier to separate coarse from fines in the feed. Both of these filters are excellent dewaterers with exceptionally high capacity. Because they separate solids from liquids by means of a filter cloth, they produce practically clear filtrate.

We have made a thorough study of coal dewatering problems . . . have made countless tests . . . and have operating data from numerous installations to show what can be done in the way of taking coal fines out of the plant effluent, leaving it so clear that it is completely re-usable. Why not let Oliver United Engineers make a study of your 'fines-handling' problem?

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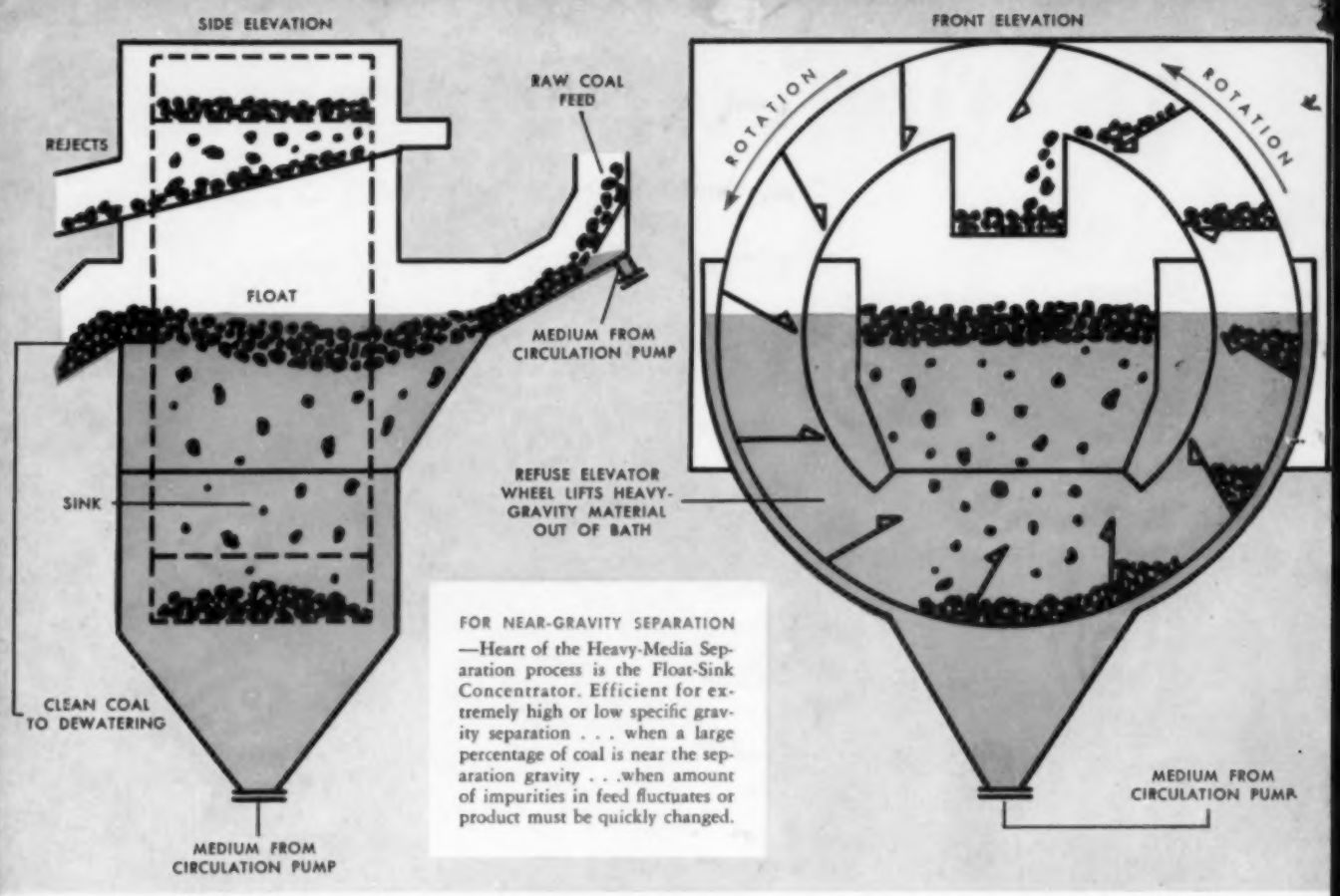


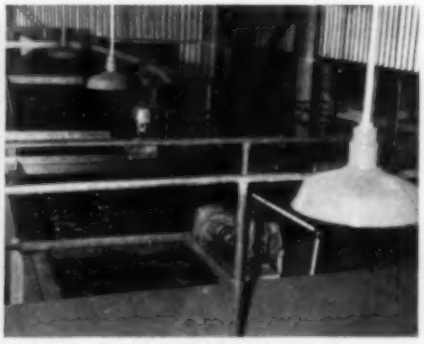
FOR NEAR-GRAVITY SEPARATION —Heart of the Heavy-Media Separation process is the Float-Sink Concentrator. Efficient for extremely high or low specific gravity separation . . . when a large percentage of coal is near the separation gravity . . .when amount of impurities in feed fluctuates or product must be quickly changed.

Choose the LINK-BELT coal washer that matches your seam and your markets

As fuel requirements grow more competitive daily, progressive coal producers are looking for ways to cut costs, develop a better product. To meet this need, Link-Belt offers three basic types of coal washers. Each is designed for a different set of conditions—all provide effective separation of slate, rock and bone.

Put Link-Belt's 60 years of coal preparation experience to work for you. Our engineers will be glad to help you and your consultants plan a single piece of equipment or a complete preparation plant . . . follow through on every detail of the entire job. For complete engineering cooperation, call the Link-Belt office near you today.

FOR CONTROLLED, ECONOMICAL WASHING — Air-pulsated washer is designed for high-capacity cleaning of sized or unsized coal. Heavier refuse is immediately removed, bone and lighter refuse sharply separated.



FOR LARGE VOLUME AT LOW COST — A Link-Belt trough separator, ahead of the air-pulsated washer, provides great added capacity with little extra investment or operating expense. Floats off large part of coal fully cleaned.

LINK-BELT

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